



**The realisation of the constitutional water  
right in South African cities through  
intelligent water management technologies**

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## **DEDICATION**

To my beloved Mother and late Father (1952.08.15 – 2016.04.08).

This is our ship.

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## **ABSTRACT**

The human right to water is fundamental to the realisation of various interdependent human rights, such as the right to health, life, equality, and human dignity. In particular, efficient water service delivery may be regarded as an integral component of advancing these rights and realising the South African constitutional water right. City authorities are central to the progress made towards realising the right to water due to their constitutionally entrenched function as water services providers and their proximity to the water needs of millions of urban dwellers. However, South Africa is recognised as a water-scarce - or water-stressed - country, and the water resources available to the country's inhabitants are extremely limited in extent. The demand for water in cities is significantly affected by this since the greater part of South Africa's population resides in urban areas.

Moreover, South African cities are afflicted with various challenges that hamper efficient water service delivery progress. These challenges include, for instance, rapid urbanisation, unbridled population growth, climate change, prolonged droughts, as well as widespread poverty and systemic local government failures, amongst others. Considering the urgency of the issues at hand, cities, now more than ever, are required to implement novel, appropriate and timely law and governance responses.

Based on a desktop analysis of the relevant legal and interdisciplinary sources, this thesis' original contribution lies in the following: This study critically examines specific water service delivery challenges in South African cities and the legal duties borne by cities in this regard. This is done with the objective of conceptualising, identifying, and analysing "intelligent water management technologies" and their potential of addressing said challenges. This research presents intelligent water management technologies as an avenue through which cities can address specific water service delivery challenges in view of improving their functioning as water providers and towards realising communities' constitutional water right.

For this purpose, the study scopes its analysis of water service delivery in cities to the interrelated challenges of non-revenue water, illegal water use, insufficient data, and water service provision sustainability. By extensively analysing the relevant legal



framework on water service delivery in the country, the study identifies numerous duties applicable to cities regarding the abovementioned challenges. The research employs the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality as subjects to ascertain cities' execution of particular water service provision-related duties. This thesis provides an original understanding of intelligent water management technologies and identifies smart water infrastructure, information and communication technologies, the Internet of Things, data science, and Big Data as components of this concept. Many potential obstacles regarding the uptake of such technologies in cities could be identified. However, by contextually applying the technological components of intelligent water management technologies to the challenges of non-revenue water, illegal water use, insufficient data, and the sustainability of water services, this study makes the finding that intelligent water management technologies can be optimised to address the aforementioned challenges adequately. This study is the first to focus on non-revenue water, illegal water use, insufficient data, and the sustainability of water services as city-level water service delivery challenges and linking it with cities' ability to address these issues by utilising intelligent water management technologies to further the realisation of the constitutional water right.

**Keywords:**

Right to water, constitutional water right, cities, water service delivery, non-revenue water, illegal water use, insufficient data, sustainability of water service provision, intelligent water management technologies, South Africa.

## **LIST OF ABBREVIATIONS**

Acad Sci	Academy of Sciences
ACHPR	African Committee on Human and People's Rights
ACRWC	African Charter on the Rights and Welfare of the Child
Afr J Intl Comp	African Journal of International and Comparative Law
AHRLJ	African Human Rights Law Journal
AHRLR	African Human Rights Law Reports
AI	Artificial Intelligence
AJICL	African Journal of International and Comparative Law
AJIL	American Journal of International Law
AMCOW	African Ministers Council on Water
AMI	Advanced Metering Infrastructure
BC Env'tl Aff L	Boston College Environmental Affairs Law Review
BCLR	Butterworths Constitutional Law Reports
CALS	Centre for Applied Legal Studies
CC	Constitutional Court
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women

CESCR	Committee on Economic, Social and Cultural Rights
CIPA	Critical Infrastructure Protection Act
CoJ	City of Johannesburg
Colum Hum Rts L Rev	Columbia Human Rights Law Review
CRC	Convention on the Rights of the Child
CSIR	Council for Scientific and Industrial Research
DMA	District Metered Areas
DWS	Department of Water and Sanitation
ECHR	European Court of Human Rights
eMM	eThekweni Metropolitan Municipality
GDP	Gross Domestic Product
Geo Intl Eenvtl L Rev	Georgetown International Environmental Law Review
Geo Wash Intl L Rev	George Washington International Law Review
Georgetown Eenvtl Law Review	Georgetown Environmental Law Review
GG	Government Gazette
GIS	Geographic Information System
GN	Government Notice
GPRS	General Packet Radio Service
HRC	Human Rights Council

ICESCR	International Covenant on Economic, Social and Cultural Rights
ICCPR	International Covenant on Civil and Political Rights
ICT	Information and Communications Technology
IDP	Integrated Development Plan
IEEE	Institute of Electrical and Electronics Engineers
IJWG	International Journal of Water Governance
ILM	International Legal Materials
Intl Aff	Journal of International Affairs
IP	Internet Protocol
IoT	Internet of Things
IT	Information Technology
ITU	International Telecommunication Union
IUDF	Integrated Urban Development Framework
IWRM	Integrated Water Resource Management
LDD	Law, Democracy and Development
LEAD	Law, Environment and Development Journal
MDG	Millennium Development Goal
MFMA	Municipal Finance Management Act
MIT	Massachusetts Institute of Technology

NCCAS	National Climate Change Adaptation Strategy
NCJ Intl L & Com Reg	North Carolina Journal of International Law and Commercial Regulation
NDP	National Development Plan
NEC TJ	Nippon Electric Company Technical Journal
NEMA	National Environmental Management Act
NGO	Non-governmental Organisation
NIWIS	National Integrated Water Information System
NMBMM	Nelson Mandela Bay Metropolitan Municipality
NRW	Non-Revenue Water
NWA	National Water Act
NWRS	National Water Resource Strategy
NWSKS	National Water Services Knowledge System
OAU	Organisation of African Unity
OECD	Organisation for Economic Co-operation and Development
PER	Potchefstroom Elektroniese Regsblad
PELJ	Potchefstroom Electronic Law Journal
PAIA	Promotion of Access to Information Act
PAJA	Promotion of Administrative Justice Act
Phys Chem Earth	Physics and Chemistry of the Earth

PWRA	Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa
RDI	Research, Development and Innovation
RDP	Reconstruction and Development Programme
RECIEL	Review of European, Comparative and International Environmental Law
SA	South Africa
SAJHR	South African Journal on Human Rights
SALGA	South African Local Government Association
SCA	Supreme Court of Appeal
Sci Eng Ethics	Science and Engineering Ethics
SERAC	Social and Economic Rights Action Centre
SFWS	Strategic Framework for Water Services
SDG	Sustainable Development Goal
Stell LR	Stellenbosch Law Review
STI	Science Technology and Innovation
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCESCR	United Nations Committee on Economic, Social and Cultural Rights

UNICEF	United Nations International Children's Emergency Fund
UNDP	United Nations Development Programme
UNDP-SIWI	United Nations Development Programme Stockholm International Water Institute
UN HRC	United Nations Human Rights Council
UN GA	United Nations General Assembly
UNOPS	United Nations Office for Project Services
UNW-DPAC	United Nations Water Decade Programme on Advocacy and Communication
WHO	World Health Organization
WRC	Water Research Commission
WSA	Water Services Act
WWF-SA	World Wildlife Fund South Africa

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# CHAPTER 1 INTRODUCTION

## 1.1 Background

South Africa is faced with an ever-increasing water resource and service delivery challenge.<sup>1</sup> According to Statistics South Africa's 2018 General Household Survey, an approximate total of 97.7% of households in metros had access to tap water.<sup>2</sup> Therefore, it is no surprise that the promise of access to safe, reliable, and proximate water supplies has always been considered a significant factor in the attractiveness of urban areas and cities.<sup>3</sup> Early on, Mumford<sup>4</sup> held that often, and somewhat paradoxically, cities' inability to provide water services serves as a vivid illustration of urban systems' failure.

Generally, there is no universally accepted or standardised definition of either a "city" or an "urban area".<sup>5</sup> Although a city may be defined based on different characteristics<sup>6</sup> of which population size is considered the most common typology employed.<sup>7</sup> Van der Berg<sup>8</sup> provides an extensive analysis of how cities are defined, and she indicates that most definitions are based on population size, geographical boundaries, administrative boundaries, and hierarchy.

Because it remains unlikely for a globally agreed-upon definition of a city to be developed any time soon, this study in the alternative relies upon the division of cities and towns

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<sup>1</sup> Swart and Adams "Water services provision and the protection of water resources" 445.

<sup>2</sup> Statistics South Africa *General Household Survey 2018* 43.

<sup>3</sup> Goonetilleke *et al Sustainable Urban Water Environment: Climate, Pollution and Adaptation* xiv. For content as to the drivers of urbanisation and the characteristics thereof, see also Goonetilleke *et al* "Spreading urbanisation and the water environment" 7.

<sup>4</sup> See generally, Mumford *The City in History: Its Origins, Transformations and its Prospects*.

<sup>5</sup> This is likely so because, as Frey and Zimmer hold: "the notion of urban remains fleeting, changing from time to time, differing across political boundaries, and being modified depending upon the purpose that the definition of urban would serve." Frey and Zimmer "Defining the City" 14. Nevertheless, according to the *Integrated Urban Development Framework: A New Deal for South African Cities and Towns* 2016 (hereafter, the *IUDF*), cities are not only the driving force for economic development, but urban spaces may be considered hubs for commerce, culture, ideas, science, social development, productivity and much more. See the *IUDF* 2016 15.

<sup>6</sup> These characteristics may include, amongst others, economic activity, population density, population levels, the status of infrastructure such as paved roads, transport and mobility networks, electricity, and piped water and sanitation systems; see UN *World Urbanisation Prospects: The 2014 Revision* 4.

<sup>7</sup> Van der Berg *Municipal planning law and policy for sustainable cities in South Africa* 30.

<sup>8</sup> Van der Berg *Municipal planning law and policy for sustainable cities in South Africa* 28 – 39.

into various human settlement typologies.<sup>9</sup> Such settlement typologies are based on the scale of urban settlements and their economic activity level or economic characteristics.<sup>10</sup> The *Constitution of the Republic of South Africa* (hereafter, the *Constitution*),<sup>11</sup> the *IUDF*, and the *Local Government: Municipal Structures Act*<sup>12</sup> (hereafter, the *Structures Act*) provides for these settlement typologies.

Cities, invariably also referred to as local governments or municipalities, are responsible for providing water services to its community.<sup>13</sup> Unfortunately, cities face numerous water provision-related challenges. In addition to lost and stolen water (known as non-revenue water), South Africa loses approximately one and a half billion cubic meters of water per year.<sup>14</sup> This is mainly due to faulty piping infrastructure that has surpassed its lifespan and suffers under the pressure of the growing water demand in highly populated areas.<sup>15</sup> Deteriorating infrastructure resultant from poor maintenance and ageing is one of the country's biggest challenges.<sup>16</sup>

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- <sup>9</sup> Settlement typologies are suggested in the *IUDF*, and divisions are made between cities, which include city regions and city areas; large towns which are divided between regional services centres 1 – 3 and service towns; small towns which include local niche towns, local towns, and rural nodes; and the rest of South Africa, divided into rural nodes in high density settlement areas, high density settlement areas, and finally, sparsely populated areas. For a full description of each, see the *IUDF* 2016 26 – 27.
- <sup>10</sup> See Harrison and Todes *Spatial Considerations in the Development of Urban Policy in South Africa: A Research Paper as Input into the Preparation of the Integrated Urban Development Framework* 12; Van der Berg *Municipal planning law and policy for sustainable cities in South Africa* 28 – 39.
- <sup>11</sup> *Constitution of the Republic of South Africa*, 1996.
- <sup>12</sup> *Local Government: Municipal Structures Act* 117 of 1998.
- <sup>13</sup> See Schedule 4B of the *Constitution*. This is an important task, considering that everyone has the right to have access to sufficient water as per s 27(1)(b) of the *Constitution*. For a general discussion as to provision of water services, see Thompson "Rights to and conditions for provision of water services" 693 – 711; Thompson "Providing water services" 723 – 759; Swart and Adams "Water services provision and the protection of water resources" 445 – 480; Couzens and Couzens "A comparison of constitutional provisions on water-related rights in Southern African states" 68 – 97; Morgan "Moonlight plumbers in comparative perspective: electoral v. constitutional politics of access to water in South Africa and New Zealand" 146 – 171; Du Plessis 2010 *RECIEL* 316 – 327; Fuo 2013 *Murdoch University Law Review* 21 – 37.; Belinskij, Kotzé and Fuo 2017 *AJICL* 261 – 292; Belinskij and Kotzé 2016 *Aquatic Procedia* 30 – 38; Kotzé and Bates 2012 *University of Denver Water Law Review* 221 – 274.
- <sup>14</sup> MIT 2017 <http://12.000.scripts.mit.edu/mission2017/case-studies/water-access-in-south-africa/>; Helen Suzman Foundation 2019 <https://hsf.org.za/publications/hsf-briefs/understanding-water-issues-and-challenges-iv-water-infrastructure-assessment>.
- <sup>15</sup> Helen Suzman Foundation 2019 <https://hsf.org.za/publications/hsf-briefs/understanding-water-issues-and-challenges-iv-water-infrastructure-assessment>.
- <sup>16</sup> Ntjatsane *Financing of infrastructure maintenance in South Africa* 2, 5.

Furthermore, cities face issues concerning poor planning, human resources, governance, and accountability.<sup>17</sup> Therefore, it is argued that the task of attaining sustainable access to water for everyone in South Africa, primarily through service delivery, is considerable.<sup>18</sup> Even in situations where there are reported increases in water access, it does not necessarily ensure sufficient access to water, as stipulated by section 27(1)(b) of the *Constitution*.<sup>19</sup> With this in mind and as per *South Africa's Water, Research, Development, and Innovation Roadmap* (hereafter the RDI Roadmap),<sup>20</sup> this current reality brings about a renewed emphasis on the need for innovative solutions, technologies, and processes to enable cities to rise to the challenge of navigating water provision complexities moving into the future.

The aforementioned is reiterated in the *National Water and Sanitation Master Plan*<sup>21</sup> (hereafter the *Master Plan*), which holds that, for South Africa to meet its increasing water demands, a "new normal" and a significant paradigm shift is required. To achieve this, the *Master Plan* postulates that decision-making concerning water provision needs to be based on sound evidence, supported by thorough research, innovation, and appropriate technology development.<sup>22</sup> Moreover, as per the Water Research Commission, innovation is regarded as one of the critical success factors essential to determining solutions to address systemic water challenges, in addition to interrelated socio-economic transformation.<sup>23</sup> In particular, this study envisions analysing how specific innovative solutions and technologies may be utilised to address South African cities' distinct water service delivery challenges. The latter is done given their function to provide

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<sup>17</sup> Helen Suzman Foundation 2019 <https://hsf.org.za/publications/hsf-briefs/understanding-water-issues-and-challenges-ii-municipalities-and-the-delivery-of-water-services>.

<sup>18</sup> Cooper 2017 *Journal of African Law* 1 – 5. Unfortunately, it is held that based on growing population, economic development projections, the scarcity of water, and the present use and efficiency levels, South Africa's water demand will amount to 17% more water than what currently exists, by 2030; see the Water Research Commission *South Africa's Water, Research, Development, and Innovation (RDI) Roadmap: 2015-2025* 1.

<sup>19</sup> Cooper 2017 *Journal of African Law* 1 – 5.

<sup>20</sup> RDI Roadmap 1.

<sup>21</sup> This plan consists of three volumes; see Volume 1 of the *National Water and Sanitation Master Plan* 2016 8.

<sup>22</sup> Volume 1 of the *Master Plan* 8.

<sup>23</sup> Water Research Commission *The South Africa Water Innovation Story* 10.

water services to communities with a view to fulfilling every person's right to have access to sufficient water.

This study investigates specific city-level water service delivery challenges and the corresponding legal duties, and presents intelligent water management technologies as an innovation that may help cities address these challenges. In this regard, intelligent water management technologies imply the integration of various systems, technologies, and sophisticated measures that allow for the control, monitoring, regulation of the usage and quality of water resources, as well as the maintenance of associated equipment and infrastructure such as pumps and pipes.<sup>24</sup> Intelligent water management technologies consist of a broad spectrum of technologies, including smart water management technologies, data science, and information and communication technologies (hereafter ICTs), which seek to facilitate and improve water management.<sup>25</sup>

This study follows a desktop-based literature review and investigation of various legal and interdisciplinary sources to determine the potential of intelligent water management technologies to address city-level water service delivery issues toward realising the constitutional right to water. However, it is recognised that additional empirical, interdisciplinary research would have complemented a study of this kind. Limitations in terms of finances, time and the Covid-19 pandemic impacted the feasibility of such an investigative method.

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<sup>24</sup> Digiteum 2019 <https://www.digiteum.com/smart-water-management-iot>; The Water Research Foundation 2019 <https://www.waterrf.org/sites/default/files/file/2019-09/4949-IntelligentWater.pdf>; see generally Suciu *et al* 2017 *IEEE*; Skoulikaris "Information-Communication Technologies as an Integrated Water Resources Management (IWRM) Tool for Sustainable Development" 180 – 194.

<sup>25</sup> The Smart Water Networks Forum *Communication in Smart Water Networks 2*; Takahiro *et al* 2015 *NEC TJ* 103 – 106; International Water Resources Association 2018 <https://www.iwra.org/swm/>; Randall and Koech 2019 *Water e-journal* 1.

## **1.2 The right to water from an international and African regional law perspective**

### ***1.2.1 International perspective***

Water can be considered a source of life and livelihood.<sup>26</sup> *Agenda 21*<sup>27</sup> holds that all aspects of life require water, and, as a general objective, adequate and good quality water supplies must be maintained for the entire population of this planet.<sup>28</sup> In 2010, the United Nations General Assembly (hereafter UN GA) explicitly recognised water as a human right and held that water is essential for realising human rights.<sup>29</sup>

Hence, water may be regarded as an indispensable element of other rights, particularly the right to adequate food and nutrition, the right to health and a healthy environment, as well as the right to life.<sup>30</sup> Water may also be viewed to represent human dignity and the value and importance of every human being.<sup>31</sup> The human right to water concerns everyone's legal entitlement to sufficient, safe, acceptable, physically accessible, and affordable water for domestic and personal use.<sup>32</sup>

The United Nations Committee on Economic, Social and Cultural Rights (hereafter UNCESCR) General Comment 15<sup>33</sup> reiterates the content of this right, where the human right to water is deemed to exist within the category of guarantees that are essential for securing an adequate standard of living. General Comment 15 is essential for determining the meaning of the right to water. In terms of General Comment 15, the right to water

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<sup>26</sup> Sershen *et al* 2016 *Water SA* 456. Before 2010, the right to water did not enjoy wide-ranging and explicit recognition on an international level; Kok and Langford "The right to water" 192.

<sup>27</sup> *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>28</sup> *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992) para 18.2.

<sup>29</sup> UN GA Res 64/292 (2010).

<sup>30</sup> It is further held that these rights cannot be attained without guaranteeing the right to access to basic clean water; Gleick 1999 *Elsevier* 1, 5; Kok and Langford "The right to water" 191. Even though the human right is now recognised internationally, access to *sufficient* and *safe* water are still an issue, especially since many people are still often forced to choose between using water for consumption and sanitation; see Tiboris 2019 *Human Rights Quarterly* 917.

<sup>31</sup> Sershen *et al* 2016 *Water SA* 456.

<sup>32</sup> It is required by the UN GA that states must offer financial resources, assist in capacity building as well as technology transfer to aid countries towards the fulfilment of this right; A 1 UN GA Res 64/292 (2010).

<sup>33</sup> Art 3 of the CESCR General Comment No 15: The Right to Water UN Doc E/C12/2002/11 (2003) (hereafter, General Comment 15).

entails both freedoms and entitlements.<sup>34</sup> The freedoms include the right to maintain access to an existing water supply, free from interferences such as arbitrary disconnections or the contamination of water supplies.<sup>35</sup>

On the other hand, entitlements include the right to a system of water supply and management that ensures equality of opportunity for people to enjoy the right to water.<sup>36</sup> The realisation of the right to water must be sustainable to ensure the availability thereof to both present and future generations.<sup>37</sup> Additionally, water is to be treated as a social and cultural good instead of primarily an economic good.<sup>38</sup>

Although the adequacy of water required to satisfy the right to water may vary as different conditions apply, certain factors apply to the right in all circumstances. These factors include the availability, quality, and accessibility of the water supply.<sup>39</sup> In terms of water accessibility, both physical and economic accessibility are necessary, including non-discrimination in water facilities or services.<sup>40</sup>

Finally, similar to most other human rights, the right to water imposes three types of duties on states.<sup>41</sup> These obligations include to respect, protect, and fulfil the right to water.<sup>42</sup> States also have an obligation to ensure the progressive realisation of the right to water and guarantee that water is adequate for human dignity, life, and health.<sup>43</sup> These steps must be concrete, deliberate, and targeted towards the full realisation of the right to water.<sup>44</sup>

The concept of the human right to water, in particular, has received increasing attention on an international law and policy level, taking the form of national constitutional guarantees, UN actions, non-governmental organisations (hereafter, NGOs,) private

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<sup>34</sup> Art 10 of General Comment 15.

<sup>35</sup> Art 10 of General Comment 15.

<sup>36</sup> Art 10 of General Comment 15.

<sup>37</sup> Art 11 of General Comment 15.

<sup>38</sup> Art 11 of General Comment 15.

<sup>39</sup> Art 12(a) – (c) of General Comment 15.

<sup>40</sup> Art 12(c)(i) – (iii) of General Comment 15.

<sup>41</sup> Art 20 of General Comment 15.

<sup>42</sup> Art 20 of General Comment 15.

<sup>43</sup> Art 17 of the General Comment 15.

<sup>44</sup> Art 17 of the General Comment 15.



actors, and the work of development organisations.<sup>45</sup> According to Gerlak, Baer, and Lopes,<sup>46</sup> although there is an observable movement towards the general acceptance of the human rights framing of the water policy across a so-called diverse group of actors, contestation exists amongst these actors concerning what precisely is the right to water and what it means in *practice*, and how states should implement a rights-based approach to water service provision.

Singh<sup>47</sup> contends that despite the many international utilitarian interventions,<sup>48</sup> the global picture on access to safe and sufficient water remains grim. This is so since, globally, at least 844 million people still lacked basic access to drinking water in 2015.<sup>49</sup> Notwithstanding this, the problem's true scale may as yet be underestimated, considering Singh's argument that crucial aspects, such as the continuous availability of water supply, the quality of drinking water, and the distance to facilities, are still not commonly measured.<sup>50</sup> Therefore, although an increase in persons with access to water may be recorded, such an increase may potentially not consider that the water is of bad quality or that it is delivered on an unreliable basis.<sup>51</sup> Figures that show increased access (over several years) do not consider water facilities that have since deteriorated or collapsed due to insufficient or proper maintenance.<sup>52</sup>

A further concern raised by O'Neill<sup>53</sup> is that currently, the human right to water can only truly be realised through action by states on a national level. This is so since human rights in general only successfully create obligations in circumstances where states are in a favourable position to realise those obligations. Unfortunately, when states are not in

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<sup>45</sup> Gerlak, Baer and Lopes 2018 *IJWG* 108 – 109.

<sup>46</sup> Gerlak, Baer and Lopes 2018 *IJWG* 109.

<sup>47</sup> Singh *The Human Right to Water* 6.

<sup>48</sup> Interventions such as national constitutional recognition of the right to water. In the alternative, where such a safeguard is missing, one may find general inclusion of principles relating to the human right to water in national laws, policies, and regulations. See Singh *The Human Right to Water* 6.

<sup>49</sup> UNDP 2020 <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-6-clean-water-and-sanitation.html>.

<sup>50</sup> Singh *The Human Right to Water* 6.

<sup>51</sup> Singh *The Human Right to Water* 6.

<sup>52</sup> Singh *The Human Right to Water* 6.

<sup>53</sup> O'Neill 2005 *Intl Aff* 434.

such a position (perhaps because they are uninterested, are too weak, or because domestic policies are not sufficient), human rights will remain merely aspirational.<sup>54</sup>

### **1.2.2 African regional perspective**

Although the *African Charter on Human and Peoples' Rights*<sup>55</sup> does not explicitly mention the right to access to water, article 16(2) holds that state parties to the Charter must take the necessary measures to protect their people's health.<sup>56</sup> Such an obligation to protect persons' health and environment may be interpreted to imply that state parties must ensure that its subjects have access to basic water and sanitation services.<sup>57</sup> Supporting this view is the African Commission on Human and People's Rights' past use of, amongst others, article 16 to derive rights such as housing and food from the right to health.<sup>58</sup> Moreover, the right to access to potable and safe water is expressly recognised as part of the right to health in the *African Charter on Human and Peoples' Rights: Principles and Guidelines*.<sup>59</sup>

Bulto posits that the absence of a comprehensive guarantee for the human right to water in the universal human rights treaties may be considered startling, but its absence in the *African Charter on Human and Peoples' Rights* is "disquieting" considering the level of water scarcity in the continent.<sup>60</sup> The legal basis and normative content for the right to water are ambiguously situated only in certain mainstream regional human rights instruments, such as the *Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa*, which provides that the state parties must take appropriate measures to provide women with access to clean drinking water.<sup>61</sup> The latter

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<sup>54</sup> Although people are able to circumvent this situation through transboundary agreements, amongst other ways, such ways do not have any primary connection to human rights; see Tiboris 2019 *Human Rights Quarterly* 921.

<sup>55</sup> *African Charter on Human and Peoples' Rights* OAU Doc CAB/LEG/67/3 rev 5 21 ILM 58 (1982).

<sup>56</sup> A 16(2) of the Charter.

<sup>57</sup> Gabru 2005 *PER* 18.

<sup>58</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR, *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96.

<sup>59</sup> (2011). This document gives content to the right to water and sanitation in the African regional context in articles 87 – 92, the wording of which bears great similarity to that in General Comment 15, amongst others.

<sup>60</sup> Bulto "The human right to water in the African human rights system" 68.

<sup>61</sup> Art 15(a) of the *Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa* (2000).

instrument does not provide content on the quantity of water that should be provided to women. Similarly, the *African Charter on the Rights and Welfare of the Child* necessitates that state parties must take measures to ensure safe drinking water to children<sup>62</sup> but is silent on the adequacy of the amount of water that must be provided. These two instruments are also applicable to only specific groups and do not ensure every person's right to water.<sup>63</sup>

Consequently, the right to water in the African-regional perspective may be understood as a derivative right since it enjoys no explicit recognition. As such, the right can only be guaranteed to the extent of its applicability and overlap with the derivative source from which it emanates.<sup>64</sup> The implication of its derivative nature is also problematic when one considers states' duty to implement such a right. This is so since the obligation it creates will vary, depending on whether it is "subsumed under other human rights or is recognised as a stand-alone right."<sup>65</sup> This derivative approach to the human right to water provides a limited picture of the right, which renders judicial and scholarly interpretations of the right in the African-regional perspective particularly valuable.

In reference to both the international and African-regional perspectives to the right to water, one may derive that while normative developments have occurred relating to the right to water,<sup>66</sup> one may readily agree with Belinskij, Kotzé, and Fuo's argument that the specific meaning and content of the right to water continues to be somewhat abstract and unclear.<sup>67</sup> Nonetheless, the right to water has been constitutionally recognised, expressly or implicitly, in many countries, including South Africa.<sup>68</sup> This study focuses on the South African constitutional water right and its relation to water service delivery in

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<sup>62</sup> See art 14(1)(c) of the *African Charter on the Rights and Welfare of the Child* (1990).

<sup>63</sup> Bulto "The human right to water in the African human rights system" 68 – 69.

<sup>64</sup> Bulto "The human right to water in the African human rights system" 73.

<sup>65</sup> Hardberger 2006 *Texas International Law Journal* 535.

<sup>66</sup> See also art vii of the *African Convention on the Conservation of Nature and Natural Resources* (2003) which, in terms of art vii (2) places the duty on all parties to the convention to "establish and implement policies for the planning, conservation, utilization, and development of underground and surface water, as well as the harvesting and use of rain water, and shall endeavor to guarantee for their populations a sufficient and continuous supply of suitable water."

<sup>67</sup> Belinskij, Kotzé and Fuo 2017 *AJICL* 262.

<sup>68</sup> The constitutional water right in South Africa will be discussed in para 2.5.1.1.

the country's cities, intending to establish how improved water service delivery may aid states (and thus also cities) in their duty to realise the right to water.

### **1.3 Water service delivery in South African cities**

There are many major issues concerning the realisation of the right to water in South Africa. These include providing access to water to individuals and households who do not currently have access, providing water to indigent users, issues pertaining affordability (such as, who should pay for water, and the privatisation of water provision), and the one-size-fits-all approach to the provision of free basic water in the country.<sup>69</sup> Other challenges include poor water quality, water scarcity, the consequences of prolonged drought and low rainfall, climate change, and the potential overexploitation of water resources.<sup>70</sup> These issues relate to both water resource management and water services management and delivery. While water resource management and service delivery is undeniably interrelated,<sup>71</sup> this study focuses specifically on water services management and delivery in South Africa.

Piketh *et al*/hold that water services management is in all likelihood one of South Africa's most complex problems for municipalities in particular.<sup>72</sup> This is especially so since trends toward more significant densification and urbanisation, along with environmental changes such as climate change and variability, are expected to exert excessive pressure on water resources at the local level.<sup>73</sup> The careful management of water supply and demand

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<sup>69</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 4; Kings 2020 <https://mg.co.za/environment/2020-01-31-water-services-worse-than-in-1994/>; see generally the Water Research Commission *Assessing the Affordability of Water Services for Residential Consumers in South African Municipalities*; and see generally Kidd 2004 *SAJHR*.

<sup>70</sup> See chapter 3 below. See also Kidd 2011 *International Journal of Rural Law and Policy* 5.

<sup>71</sup> See generally Haigh, Fox and Davies-Coleman 2010 *Water SA*.

<sup>72</sup> Piketh *et al* 2014 *Water SA* 749.

<sup>73</sup> Bartlett *et al* "Social aspects of climate change in urban areas in low and middle income nations"; Wilbanks *et al* "Industry, settlement and society" 357 – 390; Carmin, Anguelovski and Roberts 2012 *Journal of Planning, Education and Research* 77; Yohe and Leichenko 2010 *Ann New York Acad Sci* 29 – 40.

challenges, along with potential associated disaster risks that could arise from climate change, will be vital.<sup>74</sup>

Water service delivery can be linked directly to the realisation of the constitutional water right to the extent that the adequate provision of water services ensures access to sufficient water.<sup>75</sup> Given this link, this study focuses on water service delivery through the conceptual lens of the realisation of the constitutional water right. While water service delivery challenges are prevalent throughout the country, and persist in both rural and urban areas,<sup>76</sup> this study investigates challenges that cities face concerning water service delivery (which have a bearing on the realisation of the constitutional water right).

The study's focus on cities (urban localities) emanates from it being conducted in the context of the work of the South African Research Chair in Cities, Law and Environmental Sustainability.<sup>77</sup> The focus on cities also originates from the unique challenges they face concerning the realisation of the constitutional water right which hamper cities' progress in providing efficient water services. These challenges include urbanisation, urban sprawl, urban poverty, and providing water to persons located in informal settlements.<sup>78</sup> Although it is acknowledged that there are many problems that cities face concerning the provision of water services, this study focuses on specific water service delivery challenges only. These are non-revenue water loss, illegal water connections, a lack of data on water losses, and the sustainability of water services provision.<sup>79</sup> The reason for this selection is outlined in chapter 3 of this study. The delimitation of this study does not imply that problems such as water affordability are less important, but merely serves to scope the inquiry to specific problems regarding water services delivery.

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<sup>74</sup> Wilbanks *et al* "Industry, settlement and society" 357 – 390; Yohe and Leichenko 2010 *Ann New York Acad Sci* 29 – 40; Shama and Tomar 2010 *Environ Urban* 451 – 465. Various climate related risks for water may be ascertained for a particular area, such as the Gauteng province, by utilising "climate change projections". For more on this, see Piketh *et al* 2014 *Water SA* 749 – 758.

<sup>75</sup> See s 27(1)(b), s 156(1) and Schedule 4 Part B of the *Constitution*.

<sup>76</sup> Gabru 2005 *PELJ* 2.

<sup>77</sup> South African Research Chair in Cities, Law and Environmental Sustainability 2021 <http://law.nwu.ac.za/sarchi-cles-chair>.

<sup>78</sup> See generally UN Water *Water and Urbanisation*; Senn and Spuhler 2013 <https://sswm.info/node/7722>.

<sup>79</sup> See chapter 3 below.

The first challenge, water loss or non-revenue water, may be said to include all the water that is lost through both physical leakages or commercial losses (such as billing errors, theft, and meter under-registration) as well as unbilled authorised consumption (e.g., mains flushing, fire-fighting) before it reaches the consumer.<sup>80</sup> In addition to being a water-scarce country, South Africa faces massive levels of water wastage and inefficient use. In municipalities, non-revenue water is estimated at more than 37% on average, and it is worse in many irrigations and municipal supply schemes, with some losses estimated at 60%.<sup>81</sup> The World Economic Forum suggests that, in order for South African cities to increase their water supply to provide sufficient water to communities, it must, amongst other issues, drastically decrease non-revenue water to reconcile water withdrawals with supply.<sup>82</sup>

The next challenge this study seeks to address, namely illegal water use, also greatly contributes to non-revenue water in the country.<sup>83</sup> This occurs when users create illegal water connections or bypass water meters to access water without the municipality being informed thereof or the consumer paying for the resource.<sup>84</sup> In the Johannesburg Metro, for instance, 35% of non-revenue water was reported in 2017, of which 16% is unaccounted.<sup>85</sup> Moreover, in the eThekweni Metro, 40.7% of non-revenue water was reported, of which 59.3% is unaccounted.<sup>86</sup> In all likelihood, this is water lost through leaks and illegal connections, which renders it a critical issue that must be dealt with.<sup>87</sup>

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<sup>80</sup> Gumbi and Rangongo "Factors that Hinder Effective Management and the Supply of Clean Potable Water at eThekweni Municipality in KwaZulu-Natal" 625. See also para 3.3.1.3 below.

<sup>81</sup> The *National Water Resources Strategy* of 2013 9.

<sup>82</sup> World Economic Forum 2016 <https://www.weforum.org/agenda/2016/04/how-can-we-improve-south-africas-water-supply/>; Hedden *Parched Prospects II: A revised long-term water supply and demand forecast for South Africa* 10 – 11.

<sup>83</sup> Gumbi and Rangongo "Factors that Hinder Effective Management and the Supply of Clean Potable Water at eThekweni Municipality in KwaZulu-Natal" 625.

<sup>84</sup> Parliamentary Monitoring Group 2007 <https://pmg.org.za/committee-meeting/8489/>; Bratton 2017 <https://www.groundup.org.za/article/poor-service-leads-illegal-water-connections/>.

<sup>85</sup> See Business Tech 2017 <https://businesstech.co.za/news/business/160469/over-half-of-joburg-and-durbans-water-is-missing-due-to-leaks-and-illegal-usage/>.

<sup>86</sup> Business Tech 2017 <https://businesstech.co.za/news/business/160469/over-half-of-joburg-and-durbans-water-is-missing-due-to-leaks-and-illegal-usage/>.

<sup>87</sup> See McKenzie, Siqabala, Wegelin *State of Non-Revenue Water in South Africa* (2012) iii; Water Online 2017 <http://www.waterafrica.co.za/index.php/news-events/news/96-illegal-water-connections>; Business Tech 2017 <https://businesstech.co.za/news/business/160469/over-half-of-joburg-and-durbans-water-is-missing-due-to-leaks-and-illegal-usage/>.

The third challenge concerns cities' insufficient data on various aspects of water service delivery. For example, cities require data to understand where they fail and succeed in terms of service delivery, establish where inequalities persist, and for adequate and informed decision-making.<sup>88</sup> The *Master Plan* firmly states that inadequate data and information caused by weak monitoring infrastructure and systems pose substantial risks to planning and decision-making and must be addressed urgently via an effective national monitoring centre.<sup>89</sup> It is uncertain whether the current national information systems provide data of good quality and integrity concerning cities' water service provision, and as such, warrants investigation.<sup>90</sup>

The final challenge this study seeks to investigate is the sustainability of water services provision. Sustainable water service provision entails proper planning and strategic programmes aimed at creating conditions for the indefinite undisturbed provision of water services with particular agreed characteristics over time (such as water that is safe and of good quality), without undermining the surrounding environmental systems on which these services depend.<sup>91</sup> Nevertheless, often when cities construct new water and sanitation infrastructure in communities, it quickly falls into disrepair.<sup>92</sup> Studies show that water points are dysfunctional within two to five years in at least 30 to 50% of such instances.<sup>93</sup> As a result, persons are frequently left without continuous or reliable access to water supplies rendering water service delivery sustainability a significant challenge in cities.

However, some of the above challenges are in certain instances exacerbated by manifestations of larger, systemic, and institutional issues in local government.<sup>94</sup> These manifestations include, for instance, institutional and governance challenges that

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<sup>88</sup> Thakuria, Tilahun and Zellner *Seeing Cities Through Big Data: Research, Methods and Applications in Urban Informatics* 3.

<sup>89</sup> Volume 1 of the *Master Plan* 43.

<sup>90</sup> See para 3.3.3 below.

<sup>91</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 18.

<sup>92</sup> Allen and Lemme 2016 *American Water Works Association* 46.

<sup>93</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 11 – 12.

<sup>94</sup> South African Cities Network *Synthesis Report: State of Water in Cities* 19 – 21; see also generally The World Bank *Africa's Water and Sanitation Infrastructure: Access, Affordability and Alternatives*.

compromise the financial sustainability of municipalities.<sup>95</sup> Furthermore, municipalities' functioning is hampered by planning issues, insufficient engineering and other forms of expertise, a lack of accountability, and financial mismanagement.<sup>96</sup> These manifestations may directly impact, for instance, public infrastructure such as water distribution systems.

#### **1.4 The legal architecture of water service delivery in South Africa**

Section 27(1)(b) of the *Constitution* guarantees everyone the right to have access to sufficient water. In this regard, the state is expected to take reasonable legislative and other measures within its available resources to attain the progressive realisation of this right.<sup>97</sup> Section 152(1)(b) of the *Constitution* provides that it is an object of local government to ensure the provision of services to communities in a sustainable manner. Additionally, Schedule 4 Part B of the *Constitution* explicitly provides that local government is required to provide water and sanitation services to its communities, limited to potable water supply systems and domestic wastewater, as well as sewage disposal systems. As such, local governments or municipalities may be seen as playing a vital role in achieving the realisation of the constitutional water right, especially in terms of the standard of water services they provide.<sup>98</sup>

Section 40(1) of the *Constitution* holds that the South African government is constituted as national, provincial, and local spheres that are distinctive, interdependent, and interrelated.<sup>99</sup> Section 40(2) of the *Constitution* necessitates that all spheres of

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<sup>95</sup> Helen Suzman Foundation 2018 <https://hsf.org.za/publications/hsf-briefs/understanding-water-issues-and-challenges-iv-water-infrastructure-assessment>.

<sup>96</sup> Helen Suzman Foundation 2018 <https://hsf.org.za/publications/hsf-briefs/understanding-water-issues-and-challenges-iv-water-infrastructure-assessment>.

<sup>97</sup> S 27(1)(2) of the *Constitution*. See generally Magaziner 2008 *NCJ Intl L & Com Reg*. Of further relevance in this regard is section 24 of the *Constitution*. In terms of this section, everyone has the right to an environment that is not harmful to their health or wellbeing, as well as to have the environment protected through reasonable legislative and other measures which prevent pollution and ecological degradation, promotes conservation and secures ecologically sustainable development and use of natural resources (including water resources); see s 24 of the *Constitution*; Atapattu and Schapper *Human Rights and the Environment* 154 – 174.

<sup>98</sup> See generally De Visser, Cottle and Mettler 2003 *Law, Democracy & Development*; Pieterse "Components of Rights-based Urban Service Delivery" 6 – 9.

<sup>99</sup> See *South African Municipal Worker's Union v Minister of Co-Operative Governance and Traditional Affairs* 2016 3558/2013 733 (ZAGPPHC) para 13.



government must adhere to and observe the principles of cooperative governance<sup>100</sup> and conduct their activities within the spirit of chapter 3 of the *Constitution*.<sup>101</sup> Consequently, municipalities must execute their water services function within a constitutionally designed system of cooperative governance.<sup>102</sup>

Furthermore, courts are considered instrumental to the effective protection, translation, and implementation of South Africa's constitutionally entrenched socio-economic rights such as the right to water.<sup>103</sup> The Constitutional Court in the case of *Mazibuko v City of Johannesburg*<sup>104</sup> (hereafter the *Mazibuko* case) significantly contributed to the understanding of the duties imposed on the state by the constitutional right to access to sufficient water. This is so since, for the first time, the Court received the opportunity to decide on the meaning of section 27(1)(b) of the *Constitution*.<sup>105</sup> In this case, the provision of water as a duty of municipalities received attention.<sup>106</sup>

National water law reflects what has been described as a "radical" approach towards the management and distribution of water.<sup>107</sup> The country's water law seeks to address the inequality caused by the Apartheid dispensation, which is also evident in the access to

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<sup>100</sup> These principles include, for instance, that all spheres of government and all organs of state must secure the wellbeing of the people of the Republic; provide effective, transparent, accountable and coherent government for the Republic as a whole; and respect the constitutional status, institutions, powers and functions of government in the other spheres. See s 41(1) – (4) of the *Constitution*.

<sup>101</sup> Chapter 3 of the *Constitution* necessitates cooperative governance in the Republic, and outlines the principles of cooperative governance.

<sup>102</sup> Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* i.

<sup>103</sup> Mubangizi *The Protection of Human Rights in South Africa* 138 – 139.

<sup>104</sup> *Mazibuko v City of Johannesburg* 2010 3 BCLR 239 (CC).

<sup>105</sup> *Mazibuko* para 38. For further case law pertaining the right to water and water service delivery, see *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC); *City of Cape Town v Strümpher* 2012 4 SA 207 (SCA); *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC); *Minister of Water Affairs and Forestry v Stilfontein Gold Mining Company Limited* 2006 (ZAGPHC) 47 (15 May 2006); *Residents of Bon Vista Mansions v Southern Metropolitan Local Council* 2002 6 BCLR 625 (W); *Manqele v Durban Transitional Metropolitan Council* 2002 6 SA 423 (D).

<sup>106</sup> In this regard, the court noted that: "In most circumstances it will be reasonable for municipalities and provinces to strive first to achieve the prescribed (and, in the absence of a challenge, presumptively reasonable) minimum standard, before being required to go beyond that minimum standard for those to whom the minimum is already being supplied"; see *Mazibuko* para 76.

<sup>107</sup> Mubangizi *The Protection of Human Rights in South Africa* 137 – 138.

water services in South Africa.<sup>108</sup> Thus, the *National Water Act*<sup>109</sup>(hereafter the *NWA*) aims to provide for the "fundamental reform of the law relating to water resources" and provides for the effective and sustainable management of the country's water resources.<sup>110</sup> Moreover, the *Water Services Act*<sup>111</sup> (hereafter the *WSA*) deals specifically with aspects of water service provision promoting the constitutional water right and thereby contributes to the national water legislation's transformative purpose.<sup>112</sup>

The constitutional water right is given legislative effect by the *WSA*, which provides for the rights of access to basic water supply and services and sanitation in South Africa. The preamble of the *WSA* recognises that the right of access to basic water supply and basic sanitation are necessary to ensure sufficient water, and an environment that is not harmful to one's health or wellbeing.<sup>113</sup> Additionally, it acknowledges that there is a duty on all spheres of government to ensure the provision of water supply services and sanitation services in a manner that is efficient, equitable, and sustainable while adhering to the principles of cooperative governance.<sup>114</sup>

The 2001 *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*<sup>115</sup> provide clear guidelines as to the content of the right to a basic water supply. It holds that the minimum standard for basic water supply services is the provision of appropriate education in respect of effective water use and a minimum quantity of potable water of 25 litres per person per day or six kilolitres per household per month.<sup>116</sup> The above should occur at a minimum flow rate of no less than ten litres per minute and

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<sup>108</sup> The preamble to the *NWA* makes this clear where it states that: "Recognising that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources".

<sup>109</sup> *National Water Act* 36 of 1998.

<sup>110</sup> Preamble to the *NWA*. Since this study focuses on water service delivery, the *NWA* will only be discussed briefly, given its focus on water resource management.

<sup>111</sup> *Water Services Act* 108 of 1997.

<sup>112</sup> Mubangizi *The Protection of Human Rights in South Africa* 137 – 138.

<sup>113</sup> Preamble to the *WSA*.

<sup>114</sup> Preamble to the *WSA*.

<sup>115</sup> *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>116</sup> Reg 3 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

must be within 200 metres of a household.<sup>117</sup> Moreover, basic water supply services should be effective so that no consumer is without a supply for more than seven full days in any year.<sup>118</sup>

Certain instruments give practical effect to the *WSA*, such as the *Free Basic Water Implementation Strategy 2007* and the *Framework for a Municipal Indigent Policy (2005)*. These strategies will be discussed in more detail below.<sup>119</sup> The *National Development Plan 2030* (hereafter, the *NDP*)<sup>120</sup> recognises that South Africa is a water-scarce country. It addresses the water issue several times in its text while determining that considerable attention must be paid to sustainable water resource management and use.<sup>121</sup> Moreover, the *NDP* holds that an enabling milestone for South Africa is to ensure that all persons have access to clean running water in their homes.<sup>122</sup>

Initial national, and local government policy (e.g., the *White Paper*) served to lay the foundation for sector-specific policies. An example is the *IUDF*.<sup>123</sup> The *IUDF* identifies "connected infrastructure" as one of its three pillars for building connected, compact, and coordinated cities and towns.<sup>124</sup> Such infrastructure comprises more connected and resource-efficient public services, which include waste and water systems.<sup>125</sup> The framework identifies several challenges that require urgent attention. For example, it states that rapid urbanisation further increases the pressure on the natural environment, which relates to issues such as sufficient water supply, urban waste management, and air and water pollution.<sup>126</sup>

One may argue that the realisation of the constitutional water right by municipalities, through the delivery of water services to its community, is a particularly difficult task.<sup>127</sup>

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<sup>117</sup> Reg 3 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>118</sup> Reg 3 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>119</sup> See paras 4.3.11 and 4.3.12 below.

<sup>120</sup> *National Development Plan 2030* (2015) 34.

<sup>121</sup> *NDP* 177. See also para 4.3.14 below.

<sup>122</sup> *NDP* 34. See also para 4.3.14 below.

<sup>123</sup> *Integrated Urban Development Framework* (2016).

<sup>124</sup> *IUDF* 37.

<sup>125</sup> *IUDF* 37.

<sup>126</sup> *IUDF* 61.

<sup>127</sup> See para 1.3 and 1.4 above.

Therefore, beyond the strenuous water provision mandate on local governments, issues such as non-revenue water, illegal water use, insufficient data and the sustainability of water services provision complicate the matter.<sup>128</sup> This is so since municipalities are expected to continuously meet the current and growing water demand of their users, not only in terms of infrastructure and facilities but also with regards to consistent service provision, resource allocation, and water quality.<sup>129</sup>

### **1.5 Innovative approaches to water service delivery from a needs perspective**

South Africa requires innovative<sup>130</sup> solutions to problems relating to water service delivery. The recently published *White Paper on Science, Technology, and Innovation*<sup>131</sup> determines the government's long-term policy direction to ensure a growing role for science, technology, and innovation (hereafter STI) in a more prosperous and inclusive society. It focuses on using STI to accelerate inclusive economic growth, make the economy more competitive and improve people's lives.<sup>132</sup> In this regard, it states that STI can be instrumental in improving public service delivery (including water service delivery) and decision making for public policy, thereby improving the quality of life of South Africans, particularly in poor communities.<sup>133</sup> Additionally, it says that innovation is required to address the environment's protection and improve service delivery.<sup>134</sup>

Although the *WSA* or *NWA* does not mention technology or innovation explicitly, the *National Water Resource Strategy* of 2013 (hereafter, the *NWRS*) strongly encourages the use thereof for its potential to contribute to efficient and effective water management solutions that:<sup>135</sup>

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<sup>128</sup> See para 1.3 and 1.4 above.

<sup>129</sup> See para 1.4 above.

<sup>130</sup> See para 1.1 above.

<sup>131</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018.

<sup>132</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 x.

<sup>133</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 x.

<sup>134</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 6.

<sup>135</sup> The *NWRS* iv.

...respond to the needs for water security and sustainability for individuals, communities, productive and strategic water use as well as ecosystem services.

Furthermore, resolving the matter of managing water utilities forms part of the *National e-Strategy's*<sup>136</sup> nine-point plan initiative.<sup>137</sup> The *National e-Strategy* suggests that smart solutions must be introduced and integrated to support the efficient management of water utility infrastructure and modernise the utility services offered by municipalities through these infrastructures.<sup>138</sup> The strategy thereby envisions creating smarter communities.<sup>139</sup>

## 1.6 Intelligent water management technologies

Intelligent water management technologies comprise a variety of technologies and scientific disciplines. These technologies consist of smart water systems,<sup>140</sup> data science,<sup>141</sup> ICTs, the Internet of Things (hereafter the IoT),<sup>142</sup> and Big Data<sup>143</sup> to enable and improve water management.<sup>144</sup> The latter technological 'components' enable intelligent water management technologies to function at a higher capacity. Intelligent water management technologies can capture real-time information, allow for rapid response times, the ability to transmit data between remote locations and data processing facilities, and provide the opportunity for the interpretation of data before the presentation thereof to end-users.<sup>145</sup>

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<sup>136</sup> The *National e-Strategy* was established under the *Electronic Communications and Transactions Act* 25 of 2002; see GN 887 in GG 41242 of 10 November 2017.

<sup>137</sup> GN 887 in GG 41242 of 10 November 2017 15.

<sup>138</sup> GN 887 in GG 41242 of 10 November 2017 15.

<sup>139</sup> GN 887 in GG 41242 of 10 November 2017 15.

<sup>140</sup> See Owen *Smart Water Technologies and Techniques: Data Capture and Analysis for Sustainable Water Management* 4.

<sup>141</sup> The Data Science Association 2019 <http://www.datascienceassn.org/code-of-conduct.html>.

<sup>142</sup> Generally, the IoT is understood to mean the internet of all things, and refers to the interconnectivity of all things, such as humans and devices, on the worldwide web; see IoT Agenda 2019 <https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT>.

<sup>143</sup> Big Data is understood as being bulk sets of complex data, structured and unstructured, which cannot be operated on by traditional processing algorithms or techniques; Taylor-Sakyi 2016 [https://www.researchgate.net/publication/291229189\\_Big\\_Data\\_Understanding\\_Big\\_Data](https://www.researchgate.net/publication/291229189_Big_Data_Understanding_Big_Data).

<sup>144</sup> Takahiro *et al* 2015 *NEC TJ* 103 – 106; International Water Resources Association 2018 <https://www.iwra.org/swm/>; Randall and Koech 2019 *Water e-journal* 1; The Smart Water Networks Forum *Communication in Smart Water Networks* 2.

<sup>145</sup> ITU *Smart Water Management in cities* 3.

Thus, intelligent water management technologies have a broad scope of application. These technologies could be used for both planning and operational purposes, as well as for organisational and policy planning at various scales and across a multitude of sectors, contexts, and cities.<sup>146</sup> Intelligent water management technologies may allow solutions to particular issues such as managing water losses by leakage detection in pipes or meters, thereby decreasing non-revenue water, improving water quality, refining pressure and flow management, regulating water quantity, and be useful during times of floods and droughts.<sup>147</sup> Furthermore, by utilising ICTs, data collection and transfer can be made more efficient, increase the frequency of monitoring water assets, and reduce manual data errors.<sup>148</sup> In turn, the data collected from the ICT systems could be processed by utilising data science<sup>149</sup> to generate information which could add to the information at the disposal of the municipality pertaining to, for instance, water usage in specific areas, as well as illegal water use in some geographical regions based on the analysis of water use versus registered water consumers.

The originality of this research lies in its critical examination of the right to water, specific water service delivery challenges in South Africa and the corresponding legal duties on cities.<sup>150</sup> This study argues that cities and their constitutionally entrenched water service provision function are central to the realisation of the constitutional water right.<sup>151</sup> To this end, the novelty of the research extends to the identification of technologies that have the potential to address the challenges of non-revenue water, illegal water connections, insufficient data, and the sustainability of water service provision.<sup>152</sup> This study conceptualises and analyses "intelligent water management technologies" through a literature review, and presents it as an avenue for cities to address the aforementioned challenges.<sup>153</sup> It is acknowledged that determining the true veracity and potential of

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<sup>146</sup> K Water *Smart Water Management: Case Study Reports* 10.

<sup>147</sup> K Water *Smart Water Management: Case Study Reports* 10.

<sup>148</sup> World Economic Forum 2015 <https://www.weforum.org/agenda/2015/08/5-benefits-of-integrating-icts-into-water-and-sanitation-projects/>.

<sup>149</sup> Data science can be explained as a trans-disciplinary field which synthesises and builds on various relevant sources of knowledge and disciplines, including computing, informatics, statistics, sociology, management and communication; Cao 2017 *Communications of the ACM* 60.

<sup>150</sup> See chapters 2, 3 and 4 below.

<sup>151</sup> See para 2.5 and chapter 3 below.

<sup>152</sup> See chapter 5 below.

<sup>153</sup> See chapter 5 and 6 below.

intelligent water management technologies through actual pilot studies and empirical research in South African cities could benefit the findings of this study. However, through a desktop-based investigation of the current sources on the topic, the study is the first in South Africa to explore intelligent water management technologies and their potential to address specific and legally relevant South African city-level water service delivery challenges.

### **1.7 Objectives of the study**

Given the above discussion, this study's primary objective is to determine how intelligent water management technologies could help realise the constitutional water right in South African cities.

The additional objectives are:

- To contextualise and analyse the human right to water and its content from an international, African regional, and South African legal perspective.
- Critically examining water service delivery in South African cities to determine challenges impeding municipalities' progress to provide communities with access to sufficient water in fulfilment of the constitutional water right.
- To investigate the rights, duties, and obligations flowing from the national law and policy framework in general as it pertains to specific water service delivery challenges in South African cities and specific city governments, namely the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality.
- To investigate different intelligent water management technologies and explore how these could aid in realising the constitutional water right in cities, specifically the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality.

- To offer concluding remarks and recommendations about the possibilities offered by intelligent water management technologies to realise the constitutional water right in South African cities.

## **1.8 Hypothesis and assumptions**

### ***1.8.1 Hypothesis***

The study is premised on the following central hypothesis:

Cities could utilise intelligent water management technologies to address water service delivery challenges as an avenue to realising the constitutional water right in South Africa.

### ***1.8.2 Assumptions***

- South Africa is recognised as a water scarce, or water-stressed, country.
- Urbanisation and vast population growth occur at a fast rate in South Africa, increasing the pressure on especially freshwater resources.
- The realisation of the constitutional water right is central to the enjoyment of other constitutional and human rights, such as the right to a healthy environment, access to sufficient food, the right to dignity, and the right to life.
- Adequate water service delivery in cities is essential for municipalities' realisation of the right to access to sufficient water.
- There is room for improvement in terms of the water services rendered by municipalities in South Africa.

## **1.9 Research methodology**

The researcher analyses desktop-based sources by conducting a literature review of the applicable constitutional law, human rights law, water law, and legislative materials, in addition to secondary sources relevant to service delivery and understanding the potential of technology and innovation for responding to legal problems. A broad and cross-disciplinary investigation is necessary to fully comprehend the right to water as a human



rights, constitutional and legislative mandate and how intelligent water management could be utilised to address the challenges posed by water service delivery (e.g., access to water) in South African cities.

To fully comprehend the nature and potential impact of intelligent water management technologies on addressing specific water service delivery challenges in South African cities, this study is informed significantly by other disciplines not necessarily related to law such as science, technology, and engineering. This cross-discipline approach is necessary to both define and contextualise intelligent water management technologies for this study's purposes as a discipline outside the realm of law. Moreover, the study draws from publicly available research on existing cases of intelligent water management initiatives in developed and developing countries, including those from certain South African cities, as will be elaborated on below.

The sources imperative to the discussion in this thesis include national legislation and policy with some reference to international human rights legislation, African regional policies and legislation, reports of governmental and non-governmental agencies relevant to the topic at hand, the writings of academic and scientific experts, case law and the jurisprudence contained therein, internet-based sources from applicable academic, governmental and institutional organisations. Sources such as case studies, reports, strategies, and policies from individual South African municipalities concerning their water services delivery and the specific challenges they experience are, furthermore, integral to this study. The latter is in addition to the potential implementation and use of various intelligent water management technologies in this regard.

Three South African metropolitan municipalities (category A municipalities) have been identified for the purpose of drawing from their available published sources to determine their experience, potential and need for the use of intelligent water management technologies in their drive to enable water service provision to their communities. These municipalities are a) City of Johannesburg Metropolitan Municipality situated in the Gauteng province; b) eThekweni Municipality situated in the KwaZulu-Natal province; and c) Nelson Mandela Bay Municipality, situated in the Eastern Cape province. These municipalities (one of which is suffering from a severe water crisis) were selected because

they have intelligent water management initiatives or plans in place. Moreover, all of the identified municipalities suffer from specific water provision-related challenges, such as illegal water use and non-revenue water loss.<sup>154</sup> For this study's purposes, metropolitan areas are regarded as ideal since they represent the effects of ongoing urbanisation and population growth (which affects, for instance, the right to access to sufficient water) currently experienced in South African cities. The research in this study was conducted under the auspices of the South African Research Chair in Cities, Law and Environmental Sustainability, and, therefore, has a strong focus on cities and the urban context. Although the study focuses on metropolitan areas, it is hoped that some of the findings may be extrapolated to medium-size and smaller local governments.

The above method serves not only to scope the study but further allows the researcher to identify some of the main water service delivery challenges experienced by South African municipalities in terms of their constitutional mandate. The method serves to aid the researcher in highlighting and complementing different understandings and theories on the concept of intelligent water management technologies and the disciplines inherent to it in the South African landscape, in addition to the scope, function, and implementation of these technologies in municipalities; whether or not the utilisation of these technologies has aided the municipalities' water service delivery mandate; as well as experiences in complying with South Africa's water services laws and policies.

As stated earlier, it is recognised that an empirical, interdisciplinary investigation into the water service delivery challenges experienced by cities, the technologies or innovative initiatives used by municipalities to address these challenges (if any), and whether cities have utilised any intelligent water management technologies in this regard could have fortified this study. However, limited time and financial resources as well as the Covid-19 pandemic significantly impacted the feasibility of such a methodological approach.

### **1.10 Framework**

Chapter 2 of this study analyses the international, African regional, and South African legal perspectives on the human right to water. Each perspective is approached by

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<sup>154</sup> See chapter 3 and 4 below.

analysing the law and policy, jurisprudence, and scholarly discourse of the relevant geographical area. To this end, this chapter seeks to determine what is expected of states in pursuit of realising the human right to water, and, specifically, what is expected of the South African government concerning the constitutional water right.

Chapter 3 seeks to generally identify the water service delivery challenges experienced by South African cities, after which a detailed analysis of these challenges will follow. The latter challenges include non-revenue water, illegal water use, insufficient data, and the sustainability of water service provision.

Chapter 4 primarily aims to identify and analyse the national law and policy framework concerning water service delivery in three specific South African cities, namely the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality.

Chapter 5 defines and analyses what is meant by intelligent water management technologies. Subsequently, specific intelligent water management technologies are elaborated upon, including smart water technologies, data science and ICTs, and how they could be employed to improve water service delivery in South African cities. Finally, the chapter investigates the current use and potential challenges and problems concerning these technologies' uptake in South African cities.

Finally, chapter 6 seeks to make specific recommendations based on the theoretical and legal analyses in the former chapters, including how intelligent water management technologies could be utilised to improve water service delivery in South African cities and aid towards realising the constitutional water right.



## CHAPTER 2 THE RIGHT TO WATER FROM AN INTERNATIONAL, AFRICAN REGIONAL AND SOUTH AFRICAN PERSPECTIVE

### 2.1 Introduction

The right to water did not exist as an independent right until fairly recently. Instead, it slowly developed over time through the adoption of various international legal instruments that later influenced the establishment of the right in regional and domestic contexts.<sup>155</sup> No legal or state-binding regulation currently exists that guarantees universal access to water.<sup>156</sup> Nevertheless, the international instruments that contributed to the development of the right to water will be discussed in greater detail below but some of the most prominent measures include that both the *Convention on the Elimination of All Forms of Discrimination against Women*<sup>157</sup> (hereafter CEDAW) and the *Convention on the Rights of the Child*<sup>158</sup> (hereafter CRC) addressed the right to water.<sup>159</sup> In the 1990s, various international and governmental representatives began pushing for state recognition of the tragedies caused by the lack of access to water experienced globally.<sup>160</sup> Consequently, various statements and action plans demanding the sustainable development of water resources followed, such as the *New Delhi Statement*,<sup>161</sup> *Agenda 21*,<sup>162</sup> and the *Dublin Statement on Water and Sustainable Development*.<sup>163</sup>

The above efforts culminated in the adoption of the CESCR General Comment 15, which recognises that the right to water is indispensable for leading a life in human dignity.<sup>164</sup> General Comment 15 provides, by far, the most significant and detailed contribution to the right.<sup>165</sup> Furthermore, arguably one of the most promising approaches to solving the water crisis was for the UN GA to recognise water as a human right under international

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<sup>155</sup> See paras 2.3, 2.4 and 2.5 below.

<sup>156</sup> Zaragoza-Marti 2018 *WIT Transactions on The Built Environment* 23.

<sup>157</sup> (1979). The CEDAW was the first primary human rights instrument that explicitly referenced the right to water.

<sup>158</sup> (1989).

<sup>159</sup> See art 14(h)(2) of the CEDAW; arts 24(1) – (2) of the CRC.

<sup>160</sup> Lee and Best 2017 *Northeastern University School of Law* 11.

<sup>161</sup> *Global Consultation on Safe Water and Sanitation, New Delhi Statement*, A/C2/45/3 (1990).

<sup>162</sup> *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>163</sup> (1992).

<sup>164</sup> Art 1 of General Comment 15.

<sup>165</sup> See para 2.3.1.11 below.

law.<sup>166</sup> The UN's aforementioned resolution, although not legally binding on all states, was essential in emphasising the urgency of the problem by recognising that the human right to water and sanitation is vital to the full enjoyment of both life and all human rights.<sup>167</sup> Additionally, states are requested to develop mechanisms and tools to achieve the progressive realisation of the human right to water.<sup>168</sup>

With the above in mind, the ensuing chapter's objective is to contextualise the right to water and determine its content from an international, African-regional, and South African perspective. This entails establishing the development of the right, including how it has been framed and interpreted to date and what is required for it to be fulfilled or realised. A comprehensive understanding of the right is necessary since the chapters that follow will, *inter alia*, delve deeper into the challenges cities experience in implementing the water right.

Integral to this chapter is the notion that the right to water has varying contents ranging from water use for certain needs to what is expected in terms of adequate access to water that is sufficient for all needs.<sup>169</sup> Therefore, first and foremost the definition of water and the categories of water-use will be analysed to establish the content of the right to water.<sup>170</sup> This is also important for establishing the meaning of the right to water since the overall international legal consensus is that the human right to water is elaborate and includes water for domestic and personal uses.<sup>171</sup>

Next, the chapter analyses the right to water by discussing the development of various legal instruments from an international, African-regional, and South African context. The discussion of each instrument informs one as to the development and framing of the right. This analysis reveals that the right to water lacked status as an individual right in the international context until fairly recently<sup>172</sup> and still lacks this recognition in the African

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<sup>166</sup> UN GA Res 64/292 (2010).

<sup>167</sup> UN GA Res 64/292 (2010) art 1.

<sup>168</sup> UN HRC Res 15/9 (2010) art 8.

<sup>169</sup> WHO 2001

[https://www.who.int/water\\_sanitation\\_health/en/humanrights.html#:~:text=The%20content%20of%20the%20right,%2C%20cleaning%2C%20cooking%20and%20sanitation.](https://www.who.int/water_sanitation_health/en/humanrights.html#:~:text=The%20content%20of%20the%20right,%2C%20cleaning%2C%20cooking%20and%20sanitation.)

<sup>170</sup> See para 2.2 below.

<sup>171</sup> See art 2 of General Comment 15.

<sup>172</sup> See para 2.3 below.

regional context.<sup>173</sup> Thus, these legal instruments' analysis highlights different primary or "parent" rights as sources of the right to water. For instance, it intersects with various social and economic rights including the right to health and food.<sup>174</sup> Cultural and social rights are also sources from which to derive the right to water.<sup>175</sup>

The latter complexity of the right leads to at least two challenges. Firstly, the intricacy of the right and its derivative nature creates difficulty in establishing a universal definition or common understanding of the human right to water internationally, which may be one of many reasons why until recently the right has been implied in other human rights and was not directly recognised.<sup>176</sup> Secondly, the convolution of the right to water suggests that its implementation may be problematic. This is particularly challenging since, as alluded to below, it is up to local governments in South Africa to ensure access to water to the community through service delivery.<sup>177</sup> Local governments are often constrained in terms of, *inter alia*, financial, skills and resource capacity which further potentially complicates the realisation of the right to water.<sup>178</sup>

This chapter also reveals that the main difference between the international and the regional perspective versus the domestic perspective, is that the right to water is recognised as an individual right. The South African *Constitution* indicated in 1996 that, by now, everyone has the right of access to water,<sup>179</sup> which establishes a right that is *binding* on the state, in contrast to the right in the international and regional context.<sup>180</sup> The constitutional recognition of the water right led to the adoption of several national laws and policies such as the *WSA* and the *NWA*.<sup>181</sup> The aforementioned laws impose various duties on local government to ensure the progressive realisation of the right to water. The latter role of local government may have been drawn from the international

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<sup>173</sup> See para 2.4 below.

<sup>174</sup> Fantini 2019 *WIREs Water* 2.

<sup>175</sup> See para 2.3 below.

<sup>176</sup> Fantini 2019 *WIREs Water* 3.

<sup>177</sup> See chapters 3 and 4 below.

<sup>178</sup> See para 3.2 below.

<sup>179</sup> S 27(1)(b) of the *Constitution*.

<sup>180</sup> See paras 2.3, 2.4 and 2.5 below.

<sup>181</sup> See para 2.5.1 below.

context's emphasis on the need to include local governments in implementing the right to water.<sup>182</sup>

The international, African-regional, and South African perspectives are analysed from a judicial and scholarly perspective.<sup>183</sup> The judicial views illustrate how different courts have interpreted the right to water and its various dimensions. The scholarly perspective elaborates on the content of the right to water by addressing more conceptual questions.<sup>184</sup> These questions seek to address how the right is interpreted and what actions are required to fulfil the right. Finally, the chapter draws certain conclusions as to the realisation of the human right to water.

## **2.2 The definition of water and categories of domestic water use**

The right to water is multifaceted in that it implies the use of a wide variety of documents, sources, and legal instruments produced by states, NGOs and inter-governmental bodies; difficult interactions of interests relating to the right to water; the diversity of stakeholders involved; and in particular, the complexities as to defining water and the right to it.<sup>185</sup> Since the definition of water depends on the context of its application, it may have various meanings. The definition of water is pertinent since it indicates which legal regime (either domestic or international) is relevant.<sup>186</sup> Humans can (individually or collectively against both states and entities) stake a claim to their right to water in terms of the human rights regime.

Traditionally, states have proclaimed rights to both non-navigational and navigational use of water, including the quality and quantity of water.<sup>187</sup> However, the human right to water-approach considers water from a different perspective: the aforementioned right

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<sup>182</sup> See para 2.3.

<sup>183</sup> See paras 2.3.2, 2.4.2 and 2.5.2 below.

<sup>184</sup> These questions include: what is the meaning of the right to water? What are the implications of the right being predominantly derivative internationally and, until recently, regionally? What does recognising the right to water mean for the development of a country? What obligations stem from the right to water, and who/what is responsible for these obligations? Why is the constitutional recognition of the right to water significant? What are some of the challenges concerning the implementation of the constitutional water right?

<sup>185</sup> Lee and Best 2017 *Northeastern University School of Law* 5.

<sup>186</sup> For instance, the sea is ordinarily regulated by the "Law of the Sea" see Lee and Best 2017 *Northeastern University School of Law* 5.

<sup>187</sup> See the *Convention on the Law of the Non-Navigational Uses of International Watercourses* (2014).



concerns the individual or collective use of water by natural persons.<sup>188</sup> Since this study's focus is water, it is appropriate to commence with a short analysis of how water is understood in this study and its corresponding uses.

The categories of domestic water use are an essential part of the content of the right to water since humans require access to water for various uses<sup>189</sup> while as is emphasised by General Comment 15,<sup>190</sup> and as will be revealed in this chapter, the content of the right to water makes provision for specific uses only.<sup>191</sup> Understanding that there may be certain categories of water-use that are not, or cannot, be catered to by the right to water is integral, since it highlights, for instance, the role that water or the absence thereof plays in the development of a country. For instance, persons and communities who rely on growing crops as a means of economic income may be affected if their right to access to sufficient water does not entail water for productive activities.<sup>192</sup> Arguably, this affects the developmental capacity of a country where it cannot provide for access to sufficient water beyond domestic and personal use. This is particularly relevant when it is up to resource-constrained local governments to fulfil the right to access to sufficient water as is the case in South Africa.<sup>193</sup>

### **2.2.1 The definition of water**

Water is defined as the liquid that forms the seas, rivers, lakes, and rain and forms the basis of living organisms' fluids.<sup>194</sup> Pure water is tasteless, colourless, odourless and transparent. Uncontaminated and pure water is rarely found in nature due to its capacity to dissolve substances and the influence of human activities thereon, amongst other things.

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<sup>188</sup> Art 3 of General Comment 15.

<sup>189</sup> Fantini 2019 *WIREs Water* 2.

<sup>190</sup> Art 6 of General Comment 15.

<sup>191</sup> See, for instance, para 2.3.1.11 below.

<sup>192</sup> See paras 2.2.2 and 2.3, 2.4 and 2.5 below.

<sup>193</sup> See para 2.5, 3.2, 4.1 and 4.2 below.

<sup>194</sup> Oxford University Press *Concise Oxford English Dictionary* 12<sup>th</sup> ed 1631.

Nonetheless, water is considered necessary for the survival of people,<sup>195</sup> animals,<sup>196</sup> and plants.<sup>197</sup> The amount, quality, temperature, regularity of need, oxygen content, and purpose of use differ for each of the consumers mentioned above. For humans, water may be defined in terms of quantity, quality, affordability, access, usage, and location.<sup>198</sup>

Moreover, as far as humans are concerned, water is essential to maintain health, social and economic development, recreation, and job creation.<sup>199</sup> The human dependency on water goes beyond physical dependency, and also involves cultural, religious, and spiritual needs and relationships with this resource.<sup>200</sup> Therefore, it is evident that water is required to fulfil other human needs and rights, such as food, adequate housing, and health.

Although, at face value, the definition of water may seem obvious, in reality, defining water is a complicated task. As indicated above, the meaning of water may differ depending on the context in which it is used.<sup>201</sup> The definition of water also determines which legal regime may be of relevance. However, an unambiguous delineation of each relevant international legal discipline is complicated to determine, resulting from both the increase in multidisciplinary research and the inextricability of each relevant legal regime, including international environmental law, human rights law, the law on international watercourses, and international humanitarian law. Still, Lee and Best<sup>202</sup> hold that there are four key traditional perspectives from which water may be defined, namely: navigational, environmental, social and cultural, and public health definitions.

Regarding the navigational perspective as to the definition of water, it should be noted that water has traditionally been regulated for its navigational purposes.<sup>203</sup> Hence, the

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<sup>195</sup> For washing, drinking, and cooking, etc.

<sup>196</sup> For example, animals such as frogs and fish require water to breed and live in, whereas land animals require water for drinking.

<sup>197</sup> Plants require water for survival, growing and germination.

<sup>198</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 3.

<sup>199</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 3.

<sup>200</sup> Murthy 2013 *Berkley Journal of International Law* 91.

<sup>201</sup> See para 2.2.1 above.

<sup>202</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 79.

<sup>203</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 79.

surface and groundwater have been internationally regulated by the Law on International Watercourses,<sup>204</sup> whereas the sea is regulated by the Law of the Sea.<sup>205</sup> Therefore, the definition of water in this regard will be dependent on the aforementioned bodies of law.

In terms of the environmental perspective pertaining to the definition of water, water may be defined as an environmental resource.<sup>206</sup> Accordingly, international environmental law mainly regulates the sustainable development and maintenance of water quality for future generations.<sup>207</sup> From this perspective, governments, governmental organisations, and individuals' rights to utilise water are restricted by the responsibility to protect water with future generations in mind.<sup>208</sup>

Furthermore, water has social and cultural meaning, particularly to traditional local or indigenous people.<sup>209</sup> Indigenous people have complex social-ecological linkages, namely recreational, cultural, and religious ties to water in developed and developing countries.<sup>210</sup> Lastly, water may be defined from a public health perspective, particularly since water may be regarded as a public health resource.<sup>211</sup> It may be discerned that public health definitions of water are the most closely related to the human right to water since communities or individuals can demand both rights from their states.<sup>212</sup> Additionally, safe drinking water is intrinsically essential to human development and well-being.<sup>213</sup>

### ***2.2.2 The categories of domestic water use***

In the 1970s, three categories of domestic water-use were developed.<sup>214</sup> The categories were: consumptive, hygiene, and amenities.<sup>215</sup> Upon investigating these categories, it is evident that it cannot comprehensively describe domestic water-use. Hence, some 30

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<sup>204</sup> See McCaffrey *The Law of International Watercourses*.

<sup>205</sup> See the *United Nations Convention on the Law of the Sea* (1982).

<sup>206</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 80.

<sup>207</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 80.

<sup>208</sup> Simonson *The Global Water Crisis: NGO and Civil Society Perspective* 7.

<sup>209</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 81.

<sup>210</sup> Finn and Jackson 2011 *Ecosystems* 1232 – 1233.

<sup>211</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 81 – 82.

<sup>212</sup> Lee and Best 2017 *The Georgetown Env'tl Law Review* 82.

<sup>213</sup> See generally WHO *Guidelines for Drinking-water Quality* 1.

<sup>214</sup> White *et al Drawers of Water*.

<sup>215</sup> White *et al Drawers of Water*; Thompson *et al Drawers of Water II* 27; Hall, Van Koppen and Van Houweling 2014 *Sci Eng Ethics* 858.

years later, the categories were extended to include "productive uses", which comprises irrigation, horticultural activities, consumption by livestock, construction of homes, and many others.<sup>216</sup> Furthermore, it was found that water quantities for productive use by rural households with piped water connections were significant.<sup>217</sup> Each category of domestic water-use will be elaborated on below to contribute to the understanding of the content of the right to water, specifically concerning its various uses.

### *2.2.2.1 Category one: water for consumption*

The first of the four categories of domestic-water use is consumption, which entails utilising water for drinking and cooking. In terms of consumption, it may be said that water is not only a basic nutrient to the human body, but it allows for the digestion of food, the elimination of waste and toxins, and the absorption, use, and transportation of nutrients.<sup>218</sup> The human body requires a minimum amount of water intake to prevent mild or subsequent severe dehydration or death.<sup>219</sup> Although no index is universally applicable to hydration levels, mild dehydration may be the equivalent of losing 1 – 2% of body weight through fluids, whereas a loss of 2% or more amounts to severe dehydration.<sup>220</sup> Dehydration is an essential element in determining the minimum amount of water necessary for sustaining human life. For instance, in 1972, it was already held that approximately 2.6 litres of water per day are lost via perspiration, urination, respiratory loss and defecation.<sup>221</sup>

Consequently, daily water intake of three litres was deemed necessary for persons residing in tropical areas, whereas under extreme conditions such as high temperatures and hard work, this figure rises to 25 litres per person per day.<sup>222</sup> A further consideration in this regard is that certain groups of people have specific hydration requirements. These

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<sup>216</sup> Thompson *et al Drawers of Water II* 27.

<sup>217</sup> Thompson *et al Drawers of Water II* 31.

<sup>218</sup> Kleiner 1999 *Journal of the American Dietetic Association* 200 – 206.

<sup>219</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 3.

<sup>220</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 3; Kleiner 1999 *Journal of the American Dietetic Association* 200 – 206.

<sup>221</sup> See generally Gleick 1996 *Water International* 83 – 92.

<sup>222</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 10.

groups include older persons (who are at greater risk of dehydration),<sup>223</sup> children (who display higher amounts of water losses compared to adults),<sup>224</sup> pregnant or lactating women (who require additional hydration to ensure foetal needs are satisfied),<sup>225</sup> and terminally ill persons (who may accrue benefits such as lower pain and distress levels from improved hydration).<sup>226</sup>

An additional aspect of water-use for consumption is the quantities of water required for cooking and food preparation. A minimum amount of water supplies necessary for cooking could be defined as a volume of water that would enable one to prepare an adequate amount of staple food for an average family in order to provide them with sufficient nutritional benefits.<sup>227</sup> There is, however, no consensus on the specific volume of water necessary in this regard. In 1996, Gleick<sup>228</sup> held that, on average, ten litres of water per person per day is necessary for food preparation. In contrast, Thompson *et al* stated in 2001 that in East Africa, for instance, a mere 4.2 litres per person per day were utilised for both cooking and drinking by households with a piped connection, and 3.8 litres per capita per day for households lacking a piped water connection.<sup>229</sup> Bartram and Howard suggest that at least two litres per person per day is necessary for food preparation.<sup>230</sup> In 2011, however, the WHO stipulated that, to ensure survival, approximately two and a half to three litres of water is necessary for cooking and the preparation of food, but that this may depend on the climate and individual physiology.<sup>231</sup>

#### *2.2.2.2 Category two: water for hygiene purposes*

The second category of domestic water-use outlined by White<sup>232</sup> is domestic water required for hygiene purposes, which includes water for cleaning, bathing, and washing.

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<sup>223</sup> Phillips *et al* 1984 *New England Journal of Medicine* 753 – 759.

<sup>224</sup> Kleiner 1999 *Journal of the American Dietetic Association* 200 – 206.

<sup>225</sup> See generally National Academy of Sciences *Recommended dietary allowances* 10<sup>th</sup> ed.

<sup>226</sup> Jackonen 1997 *Nursing Forum* 5 – 13.

<sup>227</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 9.

<sup>228</sup> Gleick 1996 *Water International* 83 – 92.

<sup>229</sup> See Thompson *et al* *Drawers of Water II*.

<sup>230</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 9.

<sup>231</sup> WHO *Technical Notes on Drinking-Water, Sanitation and Hygiene in Emergencies* 2.

<sup>232</sup> White *et al* *Drawers of Water*.

This category is vital with respect to fulfilling the right to health and exceeds the minimum volume of water required for consumption.<sup>233</sup> Additional amounts of water are necessary for activities such as maintaining personal and food hygiene by hand, and food washing, bathing, and cleaning clothes.

Water, or a lack thereof, may result in poor hygiene and can be regarded as an integral nexus in the transmission of diseases.<sup>234</sup> In this regard, there are four main categories of transmission which relate to water.<sup>235</sup> These categories are water-related vectors (the spread of diseases through insect vectors associated with bodies of water, such as malaria and Dengue fever); water-washed (resultant from insufficient volumes of water for personal hygiene, causing illnesses such as infectious hepatitis, typhoid, and diarrhoea); water-borne (transmission through the consumption of contaminated water, causing issues such as guinea worm, diarrhoea, and infectious hepatitis); and water-based (transmission occurs in instances where an intermediate water-based host is necessary and causes schistosomiasis, guinea worm etc.).<sup>236</sup>

Given the above, water plays a significant role in many areas of life, including hygiene. Moreover, factors such as the accessibility and quality of water are essential in this regard. If the water is not of good quality, it may cause water-borne diseases. Furthermore, if households have access to water that is constrained by distance and time for collection, it may impede on their hygiene and have water-washed diseases as a consequence. Hence, households require water security,<sup>237</sup> both in terms of consumption and hygiene.<sup>238</sup>

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<sup>233</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 9.

<sup>234</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 10.

<sup>235</sup> Bradley "Health aspects of water supplies in tropical countries" 3 – 17.

<sup>236</sup> Bradley "Health aspects of water supplies in tropical countries" 3 – 17.

<sup>237</sup> See para 2.3.1.7 below for a definition of water security.

<sup>238</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 21 – 23.

### *2.2.2.3 Category three: water for amenities*

A further category of water-use is water used for amenities, which includes car-washing and lawn-mowing.<sup>239</sup> Although water-use for amenity-related activities may improve quality of life, this type of water-use will be mainly limited in the case of very vulnerable persons, such as the poor or persons from developing countries.<sup>240</sup> However, the over-utilisation of water resources for amenities is observed in developing countries, particularly in urban areas.<sup>241</sup> Therefore, it is necessary to manage the use of domestic water for amenity purposes to ensure that everyone's basic need for water is met while curbing consumption to reduce water demand.

### *2.2.2.4 Category four: water for productive purposes*

The last category of domestic water-use, noted by Thompson,<sup>242</sup> is domestic water used for productive purposes. Water for productive household use may entail small-scale food production, brewing, and household construction.<sup>243</sup> This type of water-use may amount to so-called economic uses, and typically exceeds the water ordinarily used for domestic purposes.<sup>244</sup>

Although water-use for productive purposes may compromise households' ability to meet their domestic water needs, it may be valuable for low-income households and communities and may benefit their health and wellbeing.<sup>245</sup> These benefits come from improved food security and nutrition from watering crops in domestic gardens. In urban areas, the sale of crops may result in extra income for low-income households.<sup>246</sup>

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<sup>239</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 24.

<sup>240</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 24.

<sup>241</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 24.

<sup>242</sup> Thompson *et al Drawers of Water II* 27.

<sup>243</sup> Thompson *et al Drawers of Water II* 27.

<sup>244</sup> Thompson *et al Drawers of Water II* 27; Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 23.

<sup>245</sup> Thompson *et al Drawers of Water II* 27.

<sup>246</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 24.

The definition of water, and categories of water usage, is vital in this regard to the extent that it adds to the content of the right to water by illustrating that water is necessary for specific purposes. It also contextualises how water is essential to nearly all aspects of human life, and the fulfilment of basic rights, which, with a view to the purpose of this study, accentuates how integral water provision and the realisation of the right to water is for human beings. Given just how vital water is to human existence, it is almost axiomatic to describe it as a human right. Nonetheless, the right to water has been recognised internationally by various actors, courts, and scholars. Therefore, the next section of this study broadly focusses on the right to water from an international perspective.

### **2.3 International perspectives**

Although the right to water did not exist as an independent right in the international legal context for many years, it has been subject to development over the last three decades.<sup>247</sup> While some domestic constitutions, such as the South African *Constitution*, formally recognised the right to water nearly 16 years before it was recognised internationally, the international development of the content and interpretation of the right plays a substantial role in how the right is understood regionally and domestically. The international perspective provides important content against which to measure the regional and domestic interpretation of the right.

Therefore, it is necessary to first analyse the development of the right through various legal instruments.<sup>248</sup> These instruments indicate numerous interpretations and sources of the right to water, including economic, social, and environmental sources.<sup>249</sup> The development of the right to water through various legal instruments finally culminated in General Comment 15,<sup>250</sup> which provides comprehensive content to the right (including the dimensions and interpretations developed through the preceding legal instruments), as well as the UN GA recognising the right to safe and clean drinking water through the

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<sup>247</sup> See paras 2.3.1, 2.3.1, and 2.3.3 below.

<sup>248</sup> See para 2.3.1 below.

<sup>249</sup> Gawel and Bretschneider also refer to these dimensions as the "basic objectives of drinking water policy"; see Gawel and Bretschneider 2016 *Journal for European & Environmental Planning Law* 192.

<sup>250</sup> See para 2.3.1.11 below.



adoption of a resolution.<sup>251</sup> Secondly, the international judicial perspectives will be discussed to determine how the courts interpret the right to water and determine which aspects of the right have enjoyed judicial attention. Lastly, the section will provide international scholarly perspectives, which will elaborate on the meaning of the right to water and the actions required to fulfil the right.

### **2.3.1 The legal architecture**

As mentioned above, this section seeks to determine the development of the right to water from the international legal perspective through the adoption of various legal instruments. Each instrument may contribute to the content of the right, and the actions required to fulfil it. It may also highlight the source-rights of the right to water that eventually led to its adoption as an individual or stand-alone right. This comprehensive analysis of the relevant legal instruments is necessary towards establishing the context against which both the regional and domestic right to water is understood and interpreted, especially since it is at international level where the right first came to the attention of stakeholders and governments.

#### *2.3.1.1 The "International Bill of Human Rights"*

As a starting point, the origins of the human right to water can be traced to the *Universal Declaration of Human Rights*<sup>252</sup> (hereafter the UDHR) and the *International Covenant on Economic, Social, and Cultural Rights*<sup>253</sup> (hereafter the ICESCR). Collectively, the UDHR and ICESCR are known as the "International Bill of Human Rights". These foundational legal texts provide for the normative basis from which the human right to water (and other water-related rights) developed in international law.<sup>254</sup>

Article 25 of the UDHR states that everyone has the right to an adequate standard of living for the health and wellbeing of oneself and one's family, which includes housing, food, clothing, social services, and medical care.<sup>255</sup> Articles 11 and 12 of the ICESCR

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<sup>251</sup> UN GA Res 64/292 (2010).

<sup>252</sup> (1948).

<sup>253</sup> (1966).

<sup>254</sup> Hall, Van Koppen and Van Houweling 2014 *Sci Eng Ethics* 852.

<sup>255</sup> Art 25 of the UDHR.

further contributed to the development of the water right.<sup>256</sup> Article 11(1) of the ICESCR confirmed the contents of article 25 of the UDHR and elaborated thereon by stating that everyone has a right to the continuous improvement of one's living conditions.<sup>257</sup> Additionally, article 12 mentions that everyone has the right to enjoy the highest attainable standard of physical and mental health.<sup>258</sup>

The right to an adequate standard of living, in this regard, may be interpreted to mean that every person should have the opportunity to enjoy their basic needs in conditions of dignity. Arguably, this includes access to water, and the right may be derived from these instruments.<sup>259</sup> These texts are also necessary in terms of how the right to water is framed, since it is implied that it forms part of the basic needs for one to enjoy an adequate standard of living with dignity.<sup>260</sup> Despite this, these legal texts are non-binding, and it remained necessary for a suitable legal framework to be developed that acknowledges the right to water.

### *2.3.1.2 The Mar del Plata Conference*

During several international conferences in the early 1970s, various soft law declarations were made, which paved the way for the eventual recognition of the right to water and sanitation.<sup>261</sup> The so-called genesis of the discourse on the right to water is the Mar del Plata conference, which took place in 1977 in Argentina. During this conference, an action plan concerning community water supply was devised. The plan mentioned above held that:<sup>262</sup>

... all peoples ... have the right to have access to drinking water in quantities and of a quality equal to their basic needs.

The action plan stated that it will be impossible to guarantee an improved quality of life, human dignity, and happiness unless concerted and specific actions are taken to determine relevant solutions to the water crisis and implement them at international,

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<sup>256</sup> Art 11, 12 of the ICESCR.

<sup>257</sup> Art 11(1) of the ICESCR.

<sup>258</sup> Art 12 of the ICESCR.

<sup>259</sup> Hall, Van Koppen and Van Houweling 2014 *Sci Eng Ethics* 852.

<sup>260</sup> Zaragoza-Marti 2018 *WIT Transactions on The Built Environment* 27.

<sup>261</sup> Murthy 2013 *Berkley Journal of International Law* 92.

<sup>262</sup> UN Water *Report of the United Nations Water Conference* 66.

regional, and national levels.<sup>263</sup> To ensure that water is attainable for all and distributed equitably and justly among people in all respective countries, it was recognised that international cooperation would be necessary.<sup>264</sup> Subsequently, the decade from 1981 to 1990 was deemed as the "International Drinking Water Supply and Sanitation Decade".<sup>265</sup>

As such, the action plan provided valuable content to the right to water in that it established at least five aspects of the right. Namely, *access to drinking water*, in both *quantities* and *qualities*, equal to persons' *basic needs*. This is noteworthy, since it may be seen as the first normative content ascribed to the right to water.

### *2.3.1.3 Convention on the Elimination of All Forms of Discrimination against Women*

The first legally binding international treaty to recognise the right to water is the CEDAW. This convention set out an agenda that purposes to end discrimination against women<sup>266</sup> and is frequently described as a bill of rights explicitly aimed at women.<sup>267</sup> The CEDAW enshrines many civil, political, economic, and social rights for women globally.<sup>268</sup> In regards to water, article 14(2)(h) of the convention specifically states that:<sup>269</sup>

State parties shall take all appropriate measures to eliminate discrimination against women in rural areas in order to ensure, on a basis of equality of men and women, that they participate in and benefit from rural development and, in particular, shall ensure to such women the right: ... (h) To enjoy adequate living conditions, particularly in relation to housing, sanitation, electricity and water supply, transport and communication.

As can be seen from the above, the recognition of the right to water in this instance only applied explicitly to rural women and did not apply universally. Moreover, upon interpretation, it was found that article 14 necessitates a right to clean water, as well as

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<sup>263</sup> UN Water *Report of the United Nations Water Conference* 3.

<sup>264</sup> UN Water *Report of the United Nations Water Conference* 53.

<sup>265</sup> UN Doc A/RES/34/191 (1979).

<sup>266</sup> UNW-DPAC

2012

[https://www.un.org/waterforlifedecade/pdf/human\\_right\\_to\\_water\\_and\\_sanitation\\_milestones.pdf](https://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_milestones.pdf).

<sup>267</sup> UN Women 2009 <https://www.un.org/womenwatch/daw/cedaw/cedaw.htm>.

<sup>268</sup> Cole "The Convention on the Elimination of all forms of Discrimination against Women (CEDAW)" 1.

<sup>269</sup> Art 14(2)(h) of the CEDAW.

a safe, clean, and healthy environment.<sup>270</sup> However, at this stage, there is no mention that equal access to water is required.<sup>271</sup>

Following from the above action plan formed at the Mar del Plata conference,<sup>272</sup> the CEDAW also substantiates some aspects of the normative content for the right to water. This is so, since it recognises that water should be of a certain quality (right to clean water), while explicitly recognising that water is necessary for adequate living conditions, an aspect that was implied by the UDHR and the ICESCR.<sup>273</sup> Since the CEDAW is a legally binding treaty, it produced the first binding content concerning the right to water. The CEDAW also, for the first time, suggested the prioritisation of access to water to women as a vulnerable group, which is important towards the eventual framing of the right to water in the international, regional, and domestic perspectives considered in this study.

#### *2.3.1.4 Convention on the Rights of the Child*

In 1989, a second treaty that addresses the right to water was adopted, namely the CRC. Article 24(1) of the CRC recognises that children have the right to the highest attainable standard of health. Subsequently, article 24(2) imposes a duty on state parties to take appropriate measures to combat disease and malnutrition in children, by providing them with clean drinking water, whilst considering the risks and dangers of environmental pollution.<sup>274</sup> The articles are of further significance in that the CRC directly links safe drinking water to health and includes the right to water in children's right to health.<sup>275</sup> The CRC is important in terms of the general understanding of the right to water, since it prioritises access to water for a vulnerable group.

#### *2.3.1.5 The Dublin Statement*

In January 1992, the International Conference on Water and the Environment was held in Dublin, Ireland, during which the *Dublin Statement on Water and Sustainable*

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<sup>270</sup> Committee on the Elimination of Discrimination against Women *General Recommendation No 34 on the rights of rural women* UN Doc CEDAW/C/GC34 II (2016).

<sup>271</sup> Lee and Best *The Human Right to Water* 11.

<sup>272</sup> See para 2.3.1.2 above.

<sup>273</sup> See para 2.3.1.1. above.

<sup>274</sup> Art 24(2) of the CRC.

<sup>275</sup> Lee and Best *The Human Right to Water* 11.

*Development*<sup>276</sup> (hereafter the Dublin Statement) was issued. The Dublin Statement indicates that the scarcity and misuse of freshwater presents a severe and escalating threat to sustainable development and the protection of the environment.<sup>277</sup> The statement subsequently determines that concerted action is necessary to reverse current trends of pollution, overconsumption, and growing threats from floods and droughts.<sup>278</sup> Accordingly, certain recommendations for action at international, national, and local levels were made, which resulted in the development of four guiding principles. Principle two involves that water management and development should be founded on a participatory approach that involves water users, planners, and policy-makers at all levels.<sup>279</sup> Such an approach entails raising awareness of the significance of water among the community as well as policy-makers. As such, it means that decisions must be made at the lowest appropriate level, in accordance with full public consultation and involvement of users in the planning and execution of all water projects.<sup>280</sup>

Principle four proclaims that water has an economic value in all of its competing uses and should, therefore, be recognised as an economic good.<sup>281</sup> The Dublin Statement provides vital recognition to the basic right of all human beings to have access to clean water and sanitation at an affordable rate.<sup>282</sup> When read together, the guiding principles confirm the right to water at an affordable price. However, it does not explain what is meant by the concept of affordability, and no suggestion is made regarding the meaning or content

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<sup>276</sup> The *Dublin Statement on Water and Sustainable Development* (1992).

<sup>277</sup> The *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>278</sup> The *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>279</sup> Principle two of the *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>280</sup> Principle two of the *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>281</sup> Principle four of the *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>282</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 9.

thereof.<sup>283</sup> What is clear, however, is that the right to water does not mean that water should be provided without charge.<sup>284</sup>

The commodification of water is critiqued by many scholars.<sup>285</sup> Nevertheless, some scholars argue that ensuring the management of water as an economic good is integral to achieving equitable and efficient use, and ensuring and encouraging the protection and conservation of water resources.<sup>286</sup> The concept of Integrated Water Resource Management (hereafter IWRM),<sup>287</sup> which is integral for the management and conservation of water, is closely linked to the latter argument. This is because IWRM is significantly influenced by the understanding of water as an economic good.<sup>288</sup> As such, the idea is manifested in IWRM through the aspect of "economic efficiency".<sup>289</sup>

This legal instrument's contribution to the international legal understanding of the right to water is multifaceted. The Dublin Statement made provision for both public participation and decision-making at the lowest appropriate level, which, arguably,

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<sup>283</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 9.

<sup>284</sup> Principle four of the *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>285</sup> See Bond 2007 <https://www2.ohchr.org/english/issues/water/contributions/universities/UniversityofKwaZulu-Natal.pdf>; Bond 2004 *Capitalism Nature Socialism* 17 – 25; see generally Bakker *Privatizing Water: Governance Failure and the World's Urban Water Crisis*; Bakker *Antipode* 2007 430 – 455; Bond 2010 *Review of Radical Political Economics* 445 – 464; Castro 2008 *Progress in Development Studies* 63 – 83.

<sup>286</sup> Pricing water correctly is also important when the provision of water services by municipalities is concerned, especially as it is a main source of revenue; see generally the OECD *Pricing Water Resources and Water and Sanitation Services*. Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 9; Lee and Best *The Human Right to Water* 12; Principle four of the *Dublin Statement on Water and Sustainable Development* (1992); see World Meteorological Organization 1992 <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>287</sup> IWRM is defined as "a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems", see the Global Water Partnership *Integrated Water Resource Management* 22.

<sup>288</sup> For more on IWRM and the understanding of water as an economic good, see Savenjie and Van der Zaag 2000 *Water Policy* 47 – 63; and Savenjie and Van der Zaag 2002 *Water International* 98.

<sup>289</sup> The three aspects of IWRM include economic efficiency, equity, and environmental sustainability. See the Global Water Partnership *Integrated Water Resource Management* 153; Winkler *The Human Right to Water: Significance, Legal Status and Implications for Water Allocation* 143. The Dublin principle that water should be seen as an economic good has stimulated the thinking that economic pricing and water demand management is "one and the same thing". Savenjie and Van der Zaag dispute this, and make the argument that the idea is largely misunderstood; see Savenjie and Van der Zaag 2002 *Water International* 98.

alludes to local authorities' involvement in water-related matters. Furthermore, the Dublin Statement highlighted the sustainable development, economic and environmental dimensions of the right to water, underscoring the complexity of understanding the right to water. The Dublin Statement identified actions that should be avoided and actions necessary to preserve water, which is imperative for the right to water to be realised. Finally, it contributed to the normative content of the right to water by suggesting that access to water should be *affordable*, which, until this point, has not been provided for by any preceding legal instrument.

### *2.3.1.6 Agenda 21*

The aforementioned conference in Dublin was a preparatory meeting for the UN Conference on Environment and Development (hereafter the UNCED) in Rio de Janeiro in 1992 (often called the Rio Summit) toward attaining the Millennium Development Goals (hereafter the MDGs).<sup>290</sup> *Agenda 21*, developed during the Summit, states that water resources must be protected to reconcile and satisfy the needs for water in human activities.<sup>291</sup> During the development and use of water resources, priority must be given to the satisfaction of basic needs and the protection of ecosystems.<sup>292</sup> *Agenda 21* is furthermore important towards the development and recognition of the right to water internationally since it endorsed the resolution from the Mar del Plata Conference, which holds that all peoples have the right to have access to drinking water, and called it the "commonly agreed premise".<sup>293</sup>

Additionally, *Agenda 21* recognises that:

Safe water-supplies and environmental sanitation are vital for the protection of the environment, improving health and alleviating poverty.<sup>294</sup>

It acknowledges that the consumption of contaminated water causes approximately 80% of diseases and more than one-third of deaths in developing countries.<sup>295</sup> Likewise, it

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<sup>290</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 9.

<sup>291</sup> Para 18.8 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>292</sup> Para 18.8 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>293</sup> Para 18.47 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>294</sup> Para 18.47 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>295</sup> Para 18.47 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

states that the improved management of urban water resources, including the elimination of unsustainable consumption patterns, could make a considerable contribution to the mitigation of poverty, as well as to the enhancement of the quality of life and health of both the rural and urban poor.<sup>296</sup>

*Agenda 21* highlights the role that the cooperation and participation of the local authorities of countries play in fulfilling the the legal text's objectives.<sup>297</sup> It recognises that local authorities create, operate and maintain social, economic, and environmental infrastructure, determine local regulations and policies, oversee planning processes, and assist in the implementation of subnational and national environmental policies.<sup>298</sup> *Agenda 21* states that, as the level of governance that is closest to the people, local authorities are essential in mobilising, responding to, and educating communities to promote issues such as sustainable development.<sup>299</sup> As such, it recommends that every local authority should adopt a "local *Agenda 21*" and enter into a dialogue with its community, private enterprises and local organisations.<sup>300</sup> In doing so, *Agenda 21* was one of the first international instruments to promote the notion that local authorities or cities should play a role in implementing the right to safe water supplies.

Consequently, in terms of its relevance for this study, *Agenda 21* confirmed the nexus between safe water supplies and the environment, the alleviation of poverty, quality of life, and health, and thereby illuminated the multifaceted role that the provision of water plays in sustaining human life. It confirmed aspects of the normative content of water, such as that water supplies should be safe. *Agenda 21* also alluded to the actions necessary towards fulfilling the right to water, namely, eliminating unsustainable consumption patterns. Finally, it identified local authorities as being vital for implementing the solutions suggested in *Agenda 21*. When the latter is considered with the Agenda's emphasis on the right to safe water supplies in mind, it contributes to the understanding of who the role-players are when the right to water is concerned.

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<sup>296</sup> Para 18.56 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>297</sup> Chapter 28 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>298</sup> Para 28.1 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>299</sup> Para 28.1 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).

<sup>300</sup> Para 28.3 of *Agenda 21: Programme of Action for Sustainable Development* A/Conf151/26 (1992).



### 2.3.1.7 Declarations resultant from World Water Forums

The international community's continued realisation of the seriousness of global water resource issues resulted in the establishment of both the World Water Council<sup>301</sup> and the Global Water Partnership<sup>302</sup> in 1996. These two institutions led the way for the hosting of the First World Water Forum in Marrakech, Morocco in 1997;<sup>303</sup> the Second World Water Forum in The Hague, the Netherlands, in 2000;<sup>304</sup> and the third in Kyoto, Japan in 2003.<sup>305</sup> The resultant *Marrakech Declaration* did not go as far as Mar del Plata, the Dublin Statement, or the Rio Summit concerning the right to water.<sup>306</sup>

Instead, it merely recommended that action should be taken to recognise the basic human need to have access to clean water and sanitation.<sup>307</sup> Similar recognition was provided by the *Ministerial Declaration of The Hague*,<sup>308</sup> whereas the *Kyoto Ministerial Declaration*<sup>309</sup> states that " ... we will enhance poor people's access to safe drinking water and sanitation." Of specific relevance to this study is the significant contributions made by both the *Ministerial Declaration of The Hague* and the *Kyoto Ministerial Declaration* concerning, respectively, the normative content of the right to water, and the clarification of the role of local authorities or cities in the realisation of the relevant right.

The *Ministerial Declaration of The Hague* has a strong focus on water security, which it describes as:<sup>310</sup>

...ensuring that freshwater, coastal and related ecosystems are protected and improved; that sustainable development and political stability are promoted, that every person has

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<sup>301</sup> The Council focuses on critical water issues, such as water security, adaptation and sustainability; see World Water Council 2020 <https://www.worldwatercouncil.org/en>.

<sup>302</sup> The Global Water Partnership focuses specifically on water resource management issues, and provides knowledge and information with the aim of improving water management at local, national, regional, and global levels; see Global Water Partnership 2020 <https://www.gwp.org/en/About/who/What-is-the-network/>.

<sup>303</sup> Szöllösi-Nagy *et al Water, The World's Common Heritage*.

<sup>304</sup> The Hague Water Forum 2020 [www.waterlink.net/gb/secWWF.htm](http://www.waterlink.net/gb/secWWF.htm).

<sup>305</sup> Kyoto Water Forum 2020 <http://www.world.water-forum3.com>.

<sup>306</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 11.

<sup>307</sup> The *Marrakech Declaration* (1997) 1.

<sup>308</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 3.

<sup>309</sup> The *Kyoto Ministerial Declaration* (2003); see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>310</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 1.

access to enough safe water at an affordable cost to lead a healthy and productive life and that the vulnerable are protected from the risks of water-related hazards.

The instrument provides that several challenges must be met in order for water security to be achieved.<sup>311</sup> Arguably, these challenges are significantly interwoven with realising the right to water. This is so since it identifies that meeting basic needs is a main challenge, and the actions to address it entails the recognition that access to safe and sufficient water are basic human needs which are vital for health and wellbeing, and empowering vulnerable groups such as women through a participatory water management process.<sup>312</sup>

Valuing water is another challenge, and the actions to solve it is said to entail managing water in a manner that reflects its social, economic, cultural, and environmental values for all of its uses.<sup>313</sup> This requires pricing water services also to reflect the cost of water provision, while taking into account the need for equity, as well as the basic needs of vulnerable and poor persons.<sup>314</sup> Finally, it is said that governments play a pivotal role in realising the actions necessary to address the relevant challenges.<sup>315</sup>

The *Kyoto Ministerial Declaration* emphasises the role of local authorities in its recommendations regarding actions to be taken up as commitments to attain goals and responsibilities regarding water.<sup>316</sup> For instance, it states that local authorities and people, amongst others, should be involved and empowered during the development of aquifer and basin strategies.<sup>317</sup> The Declaration recommends that local authorities should be given a permanent and official role in water-related decision-making and implementation.<sup>318</sup> It also speaks to governments in general, and provides that they

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<sup>311</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 3.

<sup>312</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 3.

<sup>313</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 3.

<sup>314</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 3.

<sup>315</sup> The *Ministerial Declaration of The Hague on Water Security in the 21st Century* (1997) art 4.

<sup>316</sup> The *Kyoto Ministerial Declaration* (2003) 64; see *Kyoto Ministerial Declaration* 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>317</sup> The *Kyoto Ministerial Declaration* (2003) 64; see *Kyoto Ministerial Declaration* 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>318</sup> The *Kyoto Ministerial Declaration* (2003) 64; see *Kyoto Ministerial Declaration* 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

should translate water laws, strategies, and plans into realistic budget estimates.<sup>319</sup> Furthermore, the *Kyoto Ministerial Declaration* provides that governments should develop various public financial instruments that are accessible to local water managers for both the development and maintenance of infrastructure that "provide water to the poor at an affordable cost".<sup>320</sup>

The *Kyoto Ministerial Declaration* continues on this note by stating that governments and local authorities are vital to development and poverty reduction, and should prioritise water in all development agendas.<sup>321</sup> It is recommended that governments should commit to mainstreaming water in both strategies and master plans.<sup>322</sup> Notably, the Declaration pays mind to productive water-use, and suggests that governments should consider appropriate targets for productive water use that may increase food production to attain a reduction in malnourishment and poverty.<sup>323</sup>

### *2.3.1.8 The Millennium Development Goals*

In the year 2000, the UN adopted eight MDGs. The MDGs varied from halving dire poverty rates to halting the spread of HIV/AIDS as well as providing universal primary education, all by the then target date of 2015.<sup>324</sup> MDG 7 addressed environmental sustainability, and target 7.C held that the proportion of the population without access to safe drinking water and sanitation should have been halved by 2015.<sup>325</sup>

From the above, one may argue that while the MDGs may have contributed to improving access to water by potentially placing the issue on the agenda of states and sub-national authorities, it was not a comprehensive effort to realise *access* to water in general.<sup>326</sup>

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<sup>319</sup> The *Kyoto Ministerial Declaration* (2003) 65; see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>320</sup> The *Kyoto Ministerial Declaration* (2003) 65; see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>321</sup> The *Kyoto Ministerial Declaration* (2003) 65; see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>322</sup> The *Kyoto Ministerial Declaration* (2003) 65; see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>323</sup> The *Kyoto Ministerial Declaration* (2003) 65; see Kyoto Ministerial Declaration 2020 <https://www.worldwatercouncil.org/en/kyoto-2003>.

<sup>324</sup> UN 2000 <https://www.un.org/millenniumgoals/>.

<sup>325</sup> UN 2000 <https://www.un.org/millenniumgoals/>.

<sup>326</sup> See generally Satterthwaite 2016 *Environment & Urbanization*.

Rather, the target identified access to safe *drinking* water as the goal to achieve.<sup>327</sup> In terms of what target 7.C of the MDGs ultimately contributed to the development of the right internationally, one may add that it specified one particular category of water-use that was necessary to tend to (namely, water for drinking), which adds to the framing of the normative content of the right to water.

### *2.3.1.9 The Johannesburg Declaration on Sustainable Development*

In 2002, the World Summit on Sustainable Development was held in Johannesburg, South Africa, which resulted in the *Johannesburg Declaration on Sustainable Development*,<sup>328</sup> and the *Plan of Implementation of the World Summit on Sustainable Development*.<sup>329</sup> As a concrete measure, the latter document reiterated the goal of halving the proportion of persons without access to safe drinking water by 2015. In response to that, the *Kyoto Ministerial Declaration*, as mentioned above, holds that in order for the MDG of safe water to be reached, access to water should be recognised as a fundamental right.<sup>330</sup> Furthermore, each country should adopt an aggressive action plan, involve investors and manufacturers, and promote partnerships.<sup>331</sup>

The *Plan of Implementation of the World Summit on Sustainable Development* provides for what is necessary to promote sustainable development, which is a necessary consideration to ensure access to water. Firstly, it necessitates good governance within each country and at the international level for promoting sustainable development.<sup>332</sup> Domestically, the Plan necessitates sound environmental, economic and social policies, the rule of law, responsive democratic institutions, gender equality, anti-corruption measures, as well as an enabling environment for investment to promote sustainable development.<sup>333</sup> In terms of its relevance to the right to water, the Plan stipulates that

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<sup>327</sup> The goal is framed differently in the later *2030 Agenda for Sustainable Development*, see para 2.3.1.14 below.

<sup>328</sup> (2002).

<sup>329</sup> *Plan of Implementation of the World Summit on Sustainable Development* A/CONF199/L7 (2002).

<sup>330</sup> These proposals were made by France; see World Water Council *The 3<sup>rd</sup> World Water Forum: Final Report* 44.

<sup>331</sup> World Water Council *The 3<sup>rd</sup> World Water Forum: Final Report* 44.

<sup>332</sup> Para 4 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>333</sup> Para 4 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

water and sanitation must be prioritised in national sustainable development strategies, as well as in poverty reduction strategies.<sup>334</sup>

Paragraphs 162 – 167 of the *Plan of Implementation of the World Summit on Sustainable Development* concerns strengthening institutional frameworks for sustainable development at the national level.<sup>335</sup> The content of these paragraphs promotes coordinated and coherent approaches to institutional frameworks for sustainable development at all national levels, including the strengthening or establishment of mechanisms and authorities responsible for the coordination, implementation and enforcement of laws, as well as for policy-making.<sup>336</sup> Furthermore, the Plan suggests promoting the establishment of sustainable development councils or coordination structures at the national and local level to ensure high-level focus on sustainable development policies.<sup>337</sup> In this regard, the Plan also encourages support efforts by all countries, especially developing countries, and countries with transitioning economies, to strengthen national and local level institutional arrangements for sustainable development.<sup>338</sup> Finally, and in connection with the above discussion on *Agenda 21*, the *Plan of Implementation of the World Summit on Sustainable Development* stipulates that states should:<sup>339</sup>

Enhance the role and capacity of local authorities as well as stakeholders in implementing *Agenda 21* and the outcomes of the Summit and in strengthening the continuing support for local *Agenda 21* programmes and associated initiatives and partnerships and encourage, in particular, partnerships among and between local authorities and other levels of government and stakeholders to advance sustainable development as called for...

Arguably, the above measures for the implementation of sustainable development at both national and local levels are integral for the right to water to succeed. This is especially true given that, throughout the Plan, the issue of access to water, including water management and services, enjoys significant attention. For instance, in terms of its

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<sup>334</sup> Para 7(m) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>335</sup> Paras 162 – 167 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>336</sup> Para 162(a) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>337</sup> Para 165 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>338</sup> Para 166 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>339</sup> See para 67 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

express commitment to MDG 7.C, the *Plan of Implementation of the World Summit on Sustainable Development* states that a programme of actions must be launched, which entails technical and financial assistance to achieve the goal on safe drinking water.<sup>340</sup> These actions include, *inter alia*, mobilising international and domestic financial resources at all levels, promoting best practice, technology transfers, and supporting capacity building for water infrastructure and services development.<sup>341</sup> The latter includes that such services and infrastructure must meet the needs of the poor and those persons who are gender-sensitive.<sup>342</sup>

In addition to many other actions, the Plan also encourages the adoption of protection and prevention measures to address water shortages and promote sustainable water-use.<sup>343</sup> It also makes provision for water management through the establishment of public-private partnerships, which should be facilitated within transparent and stable national regulatory frameworks provided by governments, while local conditions and stakeholders are respected.<sup>344</sup> The latter should entail monitoring the performance and accountability of both public institutions and private companies involved in the water management process.<sup>345</sup>

Consequently, the *Plan of Implementation of the World Summit on Sustainable Development* provides integral content towards understanding the right to water, specifically how it fits in with the need to attain sustainable development. Through this plan, it is illustrated how the right to water may be advanced by adopting sustainable development strategies, and involving both national and local government in various areas of water management. For instance, local levels of governments are encouraged to form part of capacity-building and services development. As such, the *Plan of Implementation of the World Summit on Sustainable Development* highlights the intersection between sustainable development and the right to water, and determines

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<sup>340</sup> Para 25 of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>341</sup> Para 25(a) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>342</sup> Para 25(a) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>343</sup> Para 25(e) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>344</sup> Para 25(g) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

<sup>345</sup> Para 25(g) of the *Plan of Implementation of the World Summit on Sustainable Development* (2002).

the roles and actions of both national and local government in managing water and improving access thereto.

#### *2.3.1.10 ICESCR General Comments*

Following the provisions set out by the ICESCR, the CESCR issued various "General Comments" to explain what is meant by an adequate standard of living. It is conceded that these General Comments are not binding as such since the CESCR does not have the authority to establish new obligations under the ICESCR. However, General Comments nevertheless provides an important mechanism for the development of a normative and broadly contextualised comprehension of the various provisions of the ICESCR.<sup>346</sup>

Each General Comment sets out to explain a component of the right to an adequate standard of living, such as the right to housing,<sup>347</sup> food,<sup>348</sup> and social security.<sup>349</sup> Although the level of adequacy may vary in each instance depending on different conditions, where the element of "adequacy" is concerned, it must, in all circumstances, adhere to the factors of availability, quality, and accessibility.<sup>350</sup> The accessibility factor further entails physical accessibility, economic accessibility, non-discrimination, and information accessibility.<sup>351</sup> General Comment 15 speaks specifically to the right to water and holds that the elements of the right to water must be adequate for human dignity, health, and life.<sup>352</sup>

The requirement of access to an adequate water supply has since been recognised as being of importance. There have been various debates about the relative significance of water quality, quantity, hygiene, and sanitation in improving and protecting specific

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<sup>346</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 5.

<sup>347</sup> CESCR General Comment No 4: The Right to Adequate Housing UN Doc E/1992/23 (1991); CESCR General Comment No 7: The Right to Adequate Housing UN Doc E/1998/22 (1997).

<sup>348</sup> CESCR General Comment No 12: The Right to Adequate Food UN Doc E/C12/1999/5 (1999).

<sup>349</sup> CESCR General Comment No 19: The Right to Social Security UN Doc E/C12/GC/19 (2008).

<sup>350</sup> Both water and water facilities must be accessible to everyone without discrimination, within the jurisdiction of the State party; art 12(a) – (c) of General Comment 15.

<sup>351</sup> The element of information accessibility holds that accessibility includes the right to seek, receive and convey any information concerning water-related issues; art 12(c)(i) - (iv) of General Comment 15.

<sup>352</sup> Art 2, 11 of General Comment 15.

rights, such as the right to health.<sup>353</sup> Nevertheless, the international guidelines and norms concerning the minimum water quantities needed for domestic purposes remain insufficient. For instance, according to the *Global Assessment of Water Supply and Sanitation* report of the year 2000, "reasonable access" was broadly described as the availability of at least 20 litres per person per day from a water source that is within one kilometre of the consumer's dwelling.<sup>354</sup> This definition speaks primarily to the need for access to water and does not necessarily indicate that 20 litres per person per day amounts to the recommended quantity of water needed for domestic use.<sup>355</sup> Additionally, although the MDG targets indicated that the proportion of people unable to reach or afford safe drinking water should have been halved by 2015, it did not specify the quantity of water that should have been supplied.<sup>356</sup>

#### *2.3.1.11 General Comment 15*

For the purposes of this study, and as alluded to earlier, General Comment 15 is integral for understanding the right to water, since it provides the most comprehensive information on the normative content of the right, and elaborates on the duties of states in relation thereto. General Comment 15 commences its description of the normative content on the right to water by noting that the aforementioned right entails both freedoms and entitlements.<sup>357</sup> The freedoms comprise the right to maintain access to one's existing water supply necessary for the fulfilment of the right to water, as well as the right to enjoy the right to water free from interference.<sup>358</sup> Such interferences may include arbitrary disconnections or contamination of water supplies.<sup>359</sup> Conversely, the

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<sup>353</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 1.

<sup>354</sup> WHO/UNICEF *Global Assessment of Water Supply and Sanitation* 77 – 78.

<sup>355</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 1.

<sup>356</sup> Target 7.C of the MDG's, see UN 2000 <https://www.un.org/millenniumgoals/>; Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* 1.

<sup>357</sup> Art 10 of General Comment 15.

<sup>358</sup> Art 10 of General Comment 15.

<sup>359</sup> Art 10 of General Comment 15.



entitlements include the right to a system of water supply and management which allows for equality of opportunity for persons to enjoy the right to water.<sup>360</sup>

General Comment 15 provides the content to the factors that are essential to the element of "adequacy"<sup>361</sup> as it pertains to the fulfilment of the right to water.<sup>362</sup> Firstly, the element of availability entails that the water supply to every person must both be continuous and sufficient for domestic and personal usage and that the quantity of such water supply should correspond to WHO guidelines.<sup>363</sup> According to the guidelines above, the basic need for water entails water necessary for personal hygiene, but defining a minimum amount in this instance has limited significance.<sup>364</sup> This is because the volume of water required by households depends on accessibility as determined mainly by time, distance, reliability, and potentially also costs.<sup>365</sup>

The second element of the adequacy of water in terms of the right to water is quality. It requires that water for domestic or personal use must be safe and consequently be free from chemical substances, micro-organisms, radiological hazards, and be of an acceptable odour, colour, and taste.<sup>366</sup> In terms of the WHO *Guidelines for Drinking-water Quality*, safe drinking water does not present any major risk to health over a lifetime of consumption, including certain sensitivities that may occur between different stages of life.<sup>367</sup>

The determination of safety, or the determination of an acceptable level of risk concerning the quality of drinking water in particular circumstances, is a matter in which society as

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<sup>360</sup> Art 10 of General Comment 15.

<sup>361</sup> According to art 2 of General Comment 15, "An adequate amount of safe water is necessary to prevent death from dehydration, to reduce the risk of water-related disease and to provide for consumption, cooking, personal and domestic hygienic requirements."

<sup>362</sup> Art 12 of General Comment 15.

<sup>363</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors*. Domestic and personal uses ordinarily include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene. Certain persons may require additional water due to work conditions, health and climate; art 12(a) of General Comment 15.

<sup>364</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* Executive Summary.

<sup>365</sup> Bartram and Howard *Domestic water quantity, service level and health: what should be the goal for water and health sectors* Executive Summary.

<sup>366</sup> Art 12(b) of General Comment 15.

<sup>367</sup> WHO *Guidelines for Drinking-water Quality* 1.

a whole has a role to play.<sup>368</sup> Furthermore, local environmental health authorities often play a significant role in managing drinking water supplies and ensuring its quality.<sup>369</sup> For instance, they may be responsible for the surveillance of household and community drinking water supplies, as well as catchment inspection and authorisation of catchment activities.<sup>370</sup>

The third element, namely accessibility, necessitates that water, water facilities, and services have to be accessible to everyone, free from discrimination, within the jurisdiction of the state party.<sup>371</sup> Accessibility comprises four interrelated dimensions. Firstly, the dimension of physical accessibility entails that adequate water facilities and services must be within safe physical reach for all persons.<sup>372</sup> In addition, safe, sufficient, and acceptable water must be accessible to or in the immediate vicinity of every household, workplace, and educational institution.<sup>373</sup> Water facilities and services must be of sufficient quality, sensitive to gender, life cycle and privacy requirements, and culturally appropriate.<sup>374</sup> Lastly, physical security should not be threatened during access to water services and facilities.<sup>375</sup>

The second dimension of the element of accessibility, "economic accessibility", determines that water services and facilities must be affordable for everyone.<sup>376</sup> Both the direct and indirect costs concerning securing access to water must be affordable and must not threaten or compromise the realisation of any other Covenant rights.<sup>377</sup> The third dimension, non-discrimination, emphasises that water must be accessible to all, notwithstanding the most vulnerable and marginalised portions of the population, in law and fact, without discrimination based on any of the prohibited grounds (e.g., race,

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<sup>368</sup> WHO *Guidelines for Drinking-water Quality* 3.

<sup>369</sup> WHO *Guidelines for Drinking-water Quality* 11.

<sup>370</sup> WHO *Guidelines for Drinking-water Quality* 11.

<sup>371</sup> Art 12(c) of General Comment 15.

<sup>372</sup> Art 12(c)(i) of General Comment 15.

<sup>373</sup> Art 12(c)(i) of General Comment 15.

<sup>374</sup> Art 12(c)(i) General Comment 15.

<sup>375</sup> Art 12(c)(i) of General Comment 15.

<sup>376</sup> Art 12(c)(ii) of General Comment 15. For comments on the controversy of the privatisation of water during the drafting of General Comment 15, see Russell 2011 *International Journal of Law in Context* 12 – 13.

<sup>377</sup> Art 12(c)(ii) of General Comment 15.

gender, sex).<sup>378</sup> On the other hand, the final dimension holds that accessibility entails the right to seek, receive, and impart information as to water issues.<sup>379</sup>

In addition to providing content as to the requirement of adequacy, General Comment 15 also speaks broadly to the content of the right to water, such as its legal basis. It is held that the human right to water entails everyone's entitlement to sufficient, safe, acceptable, physically accessible, and affordable water for both personal and domestic uses.<sup>380</sup> General Comment 15 recognises that water is necessary for different categories of use (as discussed above).<sup>381</sup> It is stated that water is necessary to produce food, ensure environmental hygiene, secure livelihoods, and enjoy cultural practices.<sup>382</sup> However, it is maintained that the provision of water for personal and domestic use, as well as for the prevention of starvation and diseases, and the realisation of the core obligations of certain Covenant rights, must be prioritised.<sup>383</sup>

As part of the normative content of General Comment 15,<sup>384</sup> the text determines that the right to water contains both freedoms and entitlements. The entitlements include the right to a system of water supply and management that ensures equality of opportunity for all people to enjoy the right to water. In contrast to that, the accompanying freedoms entail the right to maintain access to water supplies necessary in terms of the right to water, in conjunction with the right to be free from interference, such as arbitrary disconnections or contaminated water supplies.

The Covenant provides for the progressive realisation of the right to water and acknowledges the constraints that states may face due to the limited availability of resources.<sup>385</sup> Under General Comment 15, state parties have certain immediate obligations regarding the right to water, such as guaranteeing that the right will be

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<sup>378</sup> Art 12(c)(iii) of General Comment 15. The issue of non-discrimination is further discussed in arts 13 – 16 of General Comment 15.

<sup>379</sup> Art 12(c)(iv) of General Comment 15.

<sup>380</sup> Art 2 of General Comment 15.

<sup>381</sup> See para 2.2.2 above.

<sup>382</sup> Art 6 of General Comment 15.

<sup>383</sup> Art 6 of General Comment 15.

<sup>384</sup> Cahill 2005 *The International Journal of Human Rights* 389 – 410.

<sup>385</sup> Art 17 of General Comment 15.

exercised void of any discrimination, and the duty to take steps<sup>386</sup> to ensure the full realisation of article 11(1), and (2).<sup>387</sup> States also have both general and specific obligations towards the fulfilment of the right to water. As part of the general obligations<sup>388</sup> in terms of General Comment 15, it is held that states maintain a constant and continuous duty under the Covenant to progress as expeditiously and effectively as possible to ensure the realisation of the right to water. As with any other human right, three specific obligations are imposed on states regarding the fulfilment of the right to water, namely: obligations to respect, obligations to protect, and obligations to fulfil.<sup>389</sup>

### *2.3.1.12 UN HRC Resolutions recognising the human right to water*

There is little doubt that General Comment 15 got the proverbial "ball rolling" concerning the eventual recognition of water as a binding legal right. Soon after the decade from 2005 to 2015 was declared as the "International Decade for Action",<sup>390</sup> the UN HRC adopted a resolution that appointed an independent expert on the issue of "human rights obligations related to access to safe drinking water and sanitation."<sup>391</sup> In 2010, the UN GA, for the first time, recognised the human right to safe and clean drinking water and sanitation.<sup>392</sup> This resolution calls upon states to support the realisation of this right.<sup>393</sup> Moreover, it proclaims that the right to water is the most vital right for the enjoyment of life and all other human rights.<sup>394</sup>

In a follow-up resolution,<sup>395</sup> the HRC affirmed and clarified state obligations to work towards the realisation of the right to water, both in law and in practice. It emphasises the link between discrimination against disadvantaged groups and a lack of access to water.<sup>396</sup> The resolution identifies the right to life, health, and human dignity as sources

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<sup>386</sup> These steps must be deliberate, concrete, and aimed towards the full realisation of the right to water; see art 17 of General Comment 15.

<sup>387</sup> Art 17 of General Comment 15.

<sup>388</sup> See arts 17 – 19 of General Comment 15.

<sup>389</sup> See arts 20 – 29 of General Comment 15.

<sup>390</sup> UN GA Res 58/217 (2003).

<sup>391</sup> UN HRC Res 7/22 (2008).

<sup>392</sup> UN GA Res 64/292 (2010).

<sup>393</sup> UN GA Res 64/292 (2010).

<sup>394</sup> UN GA Res 64/292 (2010).

<sup>395</sup> HRC Res 15/9 (2010).

<sup>396</sup> HRC Res 15/9 (2010).

for the right to water.<sup>397</sup> The relevant resolution establishes the right to water as having been derived from the right to an adequate standard of living.<sup>398</sup> Finally, since the right to water is derived from various human rights law instruments, including the ICESCR, CEDAW, and the CRC, it is reaffirmed by this resolution that the human right to safe drinking water and sanitation is essential for the full enjoyment of life, and likewise of all human rights.<sup>399</sup>

As such, the resolution reaffirms that states have the primary responsibility to ensure the full realisation of all human rights and that states may, in accordance with their relevant policies, laws and regulations, include non-state actors in the provision of drinking water services.<sup>400</sup> Regardless of how the water is provided, states should make provision for accountability, transparency and non-discrimination.<sup>401</sup> The Resolution calls upon states to develop appropriate tools and mechanisms, such as legislation, strategies and plans, to fully realise the obligations related to the access to safe drinking water.<sup>402</sup> This includes adopting and implementing effective regulatory frameworks for all service providers in line with the human rights obligations of states, and to allow public regulatory institutions the capacity to monitor and enforce such regulations.<sup>403</sup>

The former resolution provided explicit recognition to the right to water at the international level.<sup>404</sup> The latter-mentioned resolution provided for issues such as confirming the various dimensions of the right and imploring states to take action, such as developing tools and mechanisms, to ensure the implementation of the right to water.<sup>405</sup> The latter resolution also prescribes *how* states should go about doing so by suggesting the principles of accountability, transparency, and accountability. While all of the above is monumental insofar as the development of the right is concerned, its recognition by the UN GA does not render it binding on all states. As such, one may

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<sup>397</sup> HRC Res 15/9 (2010).

<sup>398</sup> Lee and Best *The Human Right to Water* 16.

<sup>399</sup> HRC Res 15/9 (2010).

<sup>400</sup> HRC Res 15/9 (2010).

<sup>401</sup> HRC Res 15/9 (2010).

<sup>402</sup> HRC Res 15/9 (2010).

<sup>403</sup> HRC Res 15/9 (2010).

<sup>404</sup> UN GA Res 64/292 (2010).

<sup>405</sup> HRC Res 15/9 (2010).

conclude that it is up to governments to take up the right to water in their domestic law, and utilise national and local levels of government, as suggested by previous legal instruments,<sup>406</sup> to ensure the fulfilment of the right.

#### *2.3.1.13 The United Nations Development Programme*

The United Nations Development Programme (hereafter UNDP) provides some insight as to the human right to water. It states that water security<sup>407</sup> is reliant on ensuring that every person has reliable access to sufficient and safe water at an affordable rate to allow them to lead a healthy, productive, and dignified life while maintaining the ecological systems that equally provide, and depend on, water.<sup>408</sup> Against this backdrop, the UNDP further provides that for the human right to water to have real meaning, governments must go beyond constitutional principles and ensure that enabling legislation enshrines this right.<sup>409</sup> The human right to water has to correspond to the entitlement to a secure, affordable, and accessible water supply.<sup>410</sup> This entitlement is said to vary by country and household circumstances, but it implies the provision of a minimum of 20 litres of water per day to every person.<sup>411</sup>

#### *2.3.1.14 The 2030 Agenda for Sustainable Development*

Following the MDGs, as discussed above, the *2030 Agenda for Sustainable Development*<sup>412</sup> was adopted in 2015 by the UN, which established seventeen "Sustainable Development Goals" (hereafter, SDGs). SDG 6 holds that universal and

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<sup>406</sup> See paras 2.3.1.6 and 2.3.1.7 above.

<sup>407</sup> Bearing in mind that water is regarded as a human right, ensuring water security remains pivotal worldwide. Water security can be defined as the capacity of a population to safeguard sustainable access to acceptable quality and adequate quantities of water to sustain livelihoods, socio-economic development, and human well-being, for ensuring protection against water-borne pollution and water-related disasters, as well as for preserving ecosystems in a climate of peace and political stability. See UN-Water *Water Security & the Global Water Agenda: A UN-Water Analytical Brief* 1.

<sup>408</sup> UNDP *Human Development Report 2006 Beyond Scarcity: Power, poverty and the Global Water Crisis* 3.

<sup>409</sup> UNDP *Human Development Report 2006 Beyond Scarcity: Power, poverty and the Global Water Crisis* 24.

<sup>410</sup> UNDP *Human Development Report 2006 Beyond Scarcity: Power, poverty and the Global Water Crisis* 13.

<sup>411</sup> UNDP *Human Development Report 2006 Beyond Scarcity: Power, poverty and the Global Water Crisis* 4.

<sup>412</sup> (2015).

equitable access to safe and affordable drinking water for all must be achieved by 2030, which underscores the urgency of the global need to realise the right to water.<sup>413</sup> SDG 6 involves ensuring universal safe and affordable drinking water reaches approximately 800 million people who currently lack basic services.<sup>414</sup> It further requires improving the accessibility and safety of water services for over two billion persons.<sup>415</sup> Considering that water stress affects more than two billion people globally, it is to be expected that the realisation of SDG 6, and the right to water, could conceivably only be achieved by implementing proper strategies, legal responses, and innovative approaches.

According to the 2019 SDG report, significant progress has been made towards realising SDG 6 and, likewise, the right to water, yet 785 million people still lacked access to basic drinking water services in 2017.<sup>416</sup> Water resource availability is outpaced by various factors, such as rapid population growth. Over the last century, global water usage has increased at more than twice the rate of the expansion of the world populace.<sup>417</sup> Approximately half the world's population experiences severe water scarcity at least one month a year.<sup>418</sup>

Water as a natural resource remains under threat, especially in cities, where urbanisation is taking place at an unprecedented rate.<sup>419</sup> Therefore, although it may be determined that the right to water has sufficiently developed internationally, much more effort and positive action are required to improve access to water and water services sustainably. This might involve, for instance, a progressive enhancement in water use efficiency and provision, the exploration of innovative water management technologies, as well as improved institutional and operational cooperation.<sup>420</sup>

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<sup>413</sup> SDG 6 of the *2030 Agenda for Sustainable Development* (2015).

<sup>414</sup> UNDP 2019 <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-6-clean-water-and-sanitation.html>.

<sup>415</sup> UNDP 2019 <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-6-clean-water-and-sanitation.html>.

<sup>416</sup> UN *The Sustainable Development Goals Report 2019* 34.

<sup>417</sup> UN *The Sustainable Development Goals Report 2019* 35.

<sup>418</sup> UN *The Sustainable Development Goals Report 2019* 34.

<sup>419</sup> UN *The Sustainable Development Goals Report 2019* 34.

<sup>420</sup> UN *The Sustainable Development Goals Report 2019* 34 – 35.

Given the above, it may still be said that the international recognition of the right to water remains a significant accomplishment. It is mentionable that the recognition of the human right to water internationally would have little value if the right was never enforced. The following section aims to analyse the international judicial perspective as to the right to water to determine if the courts have relied on the right to water, and, if so, how the courts have interpreted this right. It is expected for the courts to reveal what the fulfilment of the right to water requires, including what may reasonably be expected of the executive in this regard.

### ***2.3.2 International judicial interpretations***

Evidently, a rights-based approach must be followed to interpret the right to water, which entails international legal standards by which to assess obligations, and, therefore, shifting the comprehension of rights from moral duty to legal accountability.<sup>421</sup> This rights-based approach is directed at enabling a process whereby persons are empowered to hold the state accountable to fulfil their human rights and legal entitlements.<sup>422</sup> Adopting a rights-based approach entails going beyond focusing on the content of the right, and also on the process through which the realisation of this right occurs.<sup>423</sup>

As per Du Plessis,<sup>424</sup> the perspectives of judiciaries and adjudicating bodies hold particular importance in this regard, considering that they may hold the state accountable to their obligations, and strengthen the law through judicial interpretation and reflection. Accordingly, judicial bodies are essential due to their role in determining what may be necessary for the fulfilment of the right to water, including the process, beyond what may be described in law and policy. In doing so, courts may add to the content and direction as to certain perspectives relevant to the water right. In this regard, there are several pertinent cases that both address the duties of government and which highlight the dependence of other basic rights, such as housing, on the right to water. These cases

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<sup>421</sup> Meier *et al* 2014 *Sci Eng Ethics* 835.

<sup>422</sup> WaterAid *Rights-based approaches to increasing access to water and sanitation* 17.

<sup>423</sup> WaterAid *Rights-based approaches to increasing access to water and sanitation* 17.

<sup>424</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 102.



have been considered and adjudicated upon by international bodies, such as the HRC, and the European Court of Human Rights (hereafter ECHR), and will be considered below.

### 2.3.2.1 *Naidenova v Bulgaria*<sup>425</sup>

This case concerns the Roma residents of a long-term informal settlement constructed on municipal land (the Dobri Jeliakov community), in the municipality of Sofia, Bulgaria, who were affected by the city's plans to reclaim the relevant municipal land after acceding to their presence for many decades.<sup>426</sup> Accordingly, the HRC interpreted the human right to water as forming a part of the right to housing, the right to life, as well as the prohibition against discrimination under the *International Covenant on Civil and Political Rights*<sup>427</sup> (hereafter the ICCPR).<sup>428</sup> The HRC denounced the Republic of Bulgaria for allowing the municipality of Sofia to deprive the Roma community of access to water.<sup>429</sup>

In its deliberation, the HRC held that the termination of the community's water supply effectively constituted an eviction.<sup>430</sup> Importantly, in this case, the HRC did not allow economic or commercial rationalisation of the municipality of Sofia to trump the personal needs and human rights of the Roma residents. As such, this case highlights that municipalities must prioritise the human rights of the community above its economic interests as far as is reasonable. As may be seen from domestic interpretations of human rights in South Africa, the municipality is obliged to fulfil at least the basic requirements for rights such as that to water to be fulfilled, and that the economic considerations of the municipality are not to be excluded entirely.<sup>431</sup>

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<sup>425</sup> *Naidenova v Bulgaria* CCPR/C/106/D/2073/2011 UN HRC.

<sup>426</sup> See the *Views adopted by the Committee at its 106th session (15 October–2 November 2012)* UN HRC Communication No 2073/2011 (2011) 2 – 6.

<sup>427</sup> (1966).

<sup>428</sup> The case concerned a violation of the rights enshrined specifically in arts 2, 17, and 26 of the ICCPR. See the *Views adopted by the Committee at its 106th session (15 October–2 November 2012)* UN HRC Communication No 2073/2011 (2011) 2.

<sup>429</sup> Lee and Best *The Human Right to Water* 24.

<sup>430</sup> *Views adopted by the Committee at its 106th session (15 October–2 November 2012)* UN HRC Communication No 2073/2011 (2011) 12 – 15.

<sup>431</sup> See para 2.5 and chapter 4 below.

### 2.3.2.2 *Ángela Poma Poma v Peru*<sup>432</sup>

In this case, the author of the communication (Angela Poma Poma, a Peruvian citizen born in 1950) claimed various rights violations under the ICCPR, namely:<sup>433</sup> the right not be deprived of one's means of subsistence;<sup>434</sup> to have an effective remedy upon the violation of any rights or freedoms recognised in the ICCPR;<sup>435</sup> the right to be deemed equal before courts and tribunals;<sup>436</sup> and the right not to be subjected to arbitrary or unlawful interference with one's privacy, family, home, or correspondence, nor to unlawful attacks on one's honour and reputation.<sup>437</sup> The question to be considered by the HRC was whether the consequences of the continued diversion of water by the State party (particularly by the building of wells and the diversion of rivers), as far as llama-raising by the Aymara people is concerned are such as to have a substantively negative impact on their enjoyment of the right to the cultural life of the community to which they belong. Also, the community's water deprivation by the State party resulted in their inability to obtain benefits from their traditional economic activities.<sup>438</sup> As such, this case illustrates how the economic and cultural rights of persons may act as sources from which to derive the right to water in cases where it may not be recognised explicitly.

In this matter, no meaningful consultation took place with the Aymara people, which resulted in the community being deprived of their opportunity to participate in the decision-making process.<sup>439</sup> The State party failed to conduct an assessment of the impact of their activities on the environment and on the economic activities of the relevant community. Consequently, the HRC ruled that the State party's actions substantively compromised the way of life and the Aymara people's economic activities.<sup>440</sup> From this, one may derive that the court considers certain procedural aspects, such as consultation with the community and conducting an impact assessment necessary towards

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<sup>432</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC.

<sup>433</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC 2.

<sup>434</sup> Art 1 para 2 of the ICCPR.

<sup>435</sup> Art 2 para 3(a) of the ICCPR.

<sup>436</sup> Art 14 para 1 of the ICCPR.

<sup>437</sup> Art 17 of the ICCPR.

<sup>438</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC 6 – 9.

<sup>439</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC 6 – 9.

<sup>440</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC 8.

understanding the actions necessary from the state to refrain from infringing upon the right to water. The court also values the role of public participation in this regard.

From the above case, one may note the conflict between the State party's attempts to provide water to the public and indigenous peoples' cultural and economic rights. In this regard, the HRC noted that the State may legitimately take steps to promote its economic development, but that the leeway it has in this regard must be commensurate with its duties under article 27 of the ICCPR – namely, that minorities must not be denied their right to enjoy their own culture.<sup>441</sup> The latter also clarifies the preceding case discussion, where the human rights of the community were weighed against the municipality's economic interests. The above decision demonstrates that although personal and domestic use of water may take priority in terms of General Comment 15,<sup>442</sup> upon the adjudication of the right to water, the limitation of rights may be considered, and the productive use of water may at times find priority in front of the court. Arguably, this is a valuable interpretation of the right to water in terms of the categories of water-use, and to what extent each category may be necessary for an adequate standard of living.<sup>443</sup>

### 2.3.2.3 *Riad and Idiab v Belgium*<sup>444</sup>

This case concerns the issue of access to water, and whether detaining two asylum seekers from Lebanon without providing adequate water for hygiene and consumption is in violation of the ECHR on inhumane treatment.<sup>445</sup> The applicants held, amongst other things, that their living conditions in the transit zone of Brussels National Airport amounted to a violation of article 3 of the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950).<sup>446</sup> Moreover, the applicants alleged that these conditions were meant to coerce them to leave Belgium voluntarily.<sup>447</sup>

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<sup>441</sup> *Ángela Poma Poma v Peru* 1457/2006 UN HRC 7.

<sup>442</sup> See art 6 of General Comment 15.

<sup>443</sup> See para 2.2.2 above.

<sup>444</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03.

<sup>445</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 7 – 68.

<sup>446</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 81.

<sup>447</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 42.

Although the court did not deliberate on the aforementioned allegation, the ECHR held that denying persons detained for more than ten days of water, food, facilities to take a shower or wash their clothes, amounts to degrading and inhumane treatment under the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950).<sup>448</sup> The court explicitly stated that it:<sup>449</sup>

...considers it unacceptable that anyone might be detained in conditions in which there is a complete failure to take care of his or her essential needs.

In addition to the above, the court held that these conditions caused the detainees considerable mental peril, undermined their human dignity, and humiliated and debased them.<sup>450</sup> Accordingly, this case serves as the guidepost when the human right to water in custodial situations is in question.

From the above case, in regards to the right to water, one may infer that the court considers the provision of "access" to water by the government necessary at all times for the fulfilment of one's human dignity, regardless of whether a person is detained or not. Considering a lack of access to water may constitute inhumane and degrading treatment as per this case, it is evident that the right to water underpins and concerns the fulfilment of various basic rights. Lastly, the facts of this case may be said to support the fact that an adequate standard of living includes the fulfilment of one's human dignity, and that part and parcel of such fulfilment is the provision of access to water.

#### *2.3.2.4 Tadevosyan v Armenia*<sup>451</sup>

This discussion deals with the court's interpretation of what exactly is required in terms of *access* to water. In this instance, an Armenian national was arrested and incarcerated, and provided only limited access to water.<sup>452</sup> During his incarceration, the prisoner was only provided with access to water twice a day. Before the court, the detainee relied on article 3 of the *European Convention for the Protection of Human Rights and Fundamental*

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<sup>448</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 100 – 106.

<sup>449</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 106.

<sup>450</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 107.

<sup>451</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04.

<sup>452</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04 24 – 26.

*Freedoms* (1950), which prohibits inhumane treatment and punishment.<sup>453</sup> Interestingly, the court considered exactly what level of severity of ill-treatment should be attained for it to fall within article 3.<sup>454</sup> Accordingly, the court held that whereas at least a minimum level of severity must be attained in this regard, the assessment of this so-called "minimum" is relative. The court stated that such a minimum:<sup>455</sup>

depends on all the circumstances of the case, such as the nature and context of the treatment or punishment, the manner and method of its execution, its duration, its physical or mental effects and, in some instances, the sex, age and state of health of the victim.

The court further observed that this kind of treatment is "degrading" because it was such as to arouse feelings of fear, anguish, and inferiority capable of humiliating and debasing a victim.<sup>456</sup> Additionally, in considering whether a particular form of treatment is "degrading" per the meaning of article 3,<sup>457</sup> the court paid regard to whether the object was to both humiliate and debase the victim concerned, and whether, as far as the consequences are concerned, it adversely affected the victim's personality in a manner that is incompatible with article 3.<sup>458</sup> Lastly, the court stated that it is unacceptable for one to be detained in "conditions in which no provision has been made for meeting his or her basic needs".<sup>459</sup> Consequently, the ECHR ruled that the failure to provide a detainee with adequate access to water and sanitation in effect violates article 3 of the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950).<sup>460</sup>

From this case, it may be perceived that "adequate access to water" constitutes an amount that satisfies basic needs. However, the court failed to give content to any

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<sup>453</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04 36.

<sup>454</sup> Art 3 of the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950). *Tadevosyan v Armenia* 2008 ECHR 41698/04 44.

<sup>455</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04 44. See *Ireland v the United Kingdom* 18 January 1978 Series A no 25 65, 162.

<sup>456</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04 49; see *Kudła v Poland* ECHR 2000-XI 30210/96.

<sup>457</sup> Art 3 of the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950).

<sup>458</sup> Art 3 of the *European Convention for the Protection of Human Rights and Fundamental Freedoms* (1950); *Tadevosyan v Armenia* 2008 ECHR 41698/04 49; *Raninen v Finland* 16 December 1997 Reports of Judgments and Decisions 1997-VIII 2821-22, 55. The court noted that the absence of any such object/ purpose cannot be said to conclusively rule out a finding of a violation of article 3; see *Tadevosyan v Armenia* 2008 ECHR 41698/04 49; and *Peers v Greece* no 28524/95 74 ECHR 2001-III.

<sup>459</sup> *Riad and Idiab v Belgium* 2008 ECHR 29810/03 106.

<sup>460</sup> *Tadevosyan v Armenia* 2008 ECHR 41698/04 58 – 59.

potential standard or prescribed minimum amount of water that could be regarded as sufficient in this case. What is made clear by this case is that states must observe the multifaceted duties they face concerning the right to water and that these various obligations must be met in order for one's right to adequate access to water and an adequate standard of living to be met. Hence, the case confirms the complexity of the fulfilment of the right to water and opens the door to discussing deprivation of water and sanitation as being akin to inhumane treatment.<sup>461</sup> On this note, the next section of this study aims to discuss perspectives in the scholarly discourse surrounding the right to water, specifically how the right is interpreted and the various obligations that are associated with its fulfilment.

### ***2.3.3 International theories and scholarly perspectives***

The international community has been flooded with scholarly discourse and critique on, especially, the normative content of the right to water. This is likely so since water is seen as the essence of life.<sup>462</sup> According to a 2006 report by the UNDP, water pervades all facets of human development.<sup>463</sup> However, countries, big and small, developed and developing, all experience problems pertaining to water quantity, quality, access and affordability.<sup>464</sup> Water shortages can lead to death from dehydration, acute diseases, and risks such as diarrhoea, malaria, and many others.<sup>465</sup>

In particular, vulnerable groups such as women, children, disabled persons, minority groups, older persons, refugees, and indigenous persons, detainees and prisoners are the most susceptible to water-related issues.<sup>466</sup> In Sub-Saharan Africa, households often have no choice but to travel lengthy distances to fetch water.<sup>467</sup> For instance, in Malawi, Burundi and Mauritania, 20% of households have to walk an hour or more to the closest standpipe and back. Although this might provide households with clean water, the health

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<sup>461</sup> Lee and Best *The Human Right to Water* 24.

<sup>462</sup> UNHCR *The Right to Water* 1.

<sup>463</sup> UNDP *Human Development Report 2006: Beyond Scarcity—Power, poverty and the Global Water Crisis* 2.

<sup>464</sup> Lee and Best *The Human Right to Water* 3.

<sup>465</sup> Lee and Best *The Human Right to Water* 3.

<sup>466</sup> Art 16 of General Comment 15.

<sup>467</sup> Sorenson, Morssink, and Campos 2011 *Social Science and Medicine* 1522 – 1526.

benefits may diminish with such distances,<sup>468</sup> and women and children often have to spend their time fetching water instead of focussing on income-generation or education.<sup>469</sup>

While scarcity is considered to be at the heart of the global water problem, the roots of the issue may run deeper. Water scarcity may be attributed to various factors, such as poverty, inequality, and unequal distribution of powers.<sup>470</sup> The situation is further exacerbated by environmental and social problems, namely rapid urbanisation and population growth, climate change, depletion of existing water sources, and persistent pollution.<sup>471</sup>

Consequently, the international recognition of the right to water is significant. The framing of water as a human right may be understood as a confirmation of water's significance for the fulfilment of human dignity.<sup>472</sup> According to Murthy,<sup>473</sup> the concept of a human right to water has been an integral vehicle for communities worldwide to generate attention to the perceived injustices and inequalities concerning access to an essential natural resource and services with major public health implications. Moreover, it may be seen as a response to international water service trends that have increasingly emphasised financial sustainability, efficiency, and privatisation.<sup>474</sup>

Several aspects prompted the acknowledgement of water as a human right. However, Bakker<sup>475</sup> holds that the argument for the eventual recognition of water as a human right generally rests on two justifications. The first justification rests on the "non-substitutability" of drinking water since it is essential for life.<sup>476</sup> The second justification entails the dependence of many other human rights, explicitly recognised by UN

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<sup>468</sup> Pickering and Davis 2012 *Environmental Science & Technology* 2391 – 2397.

<sup>469</sup> Kevany and Donald 2013 *Journal of Cleaner Production* 53 – 64.

<sup>470</sup> For instance, in some water stressed areas in India, irrigation pumps extract water 24 hours a day from aquifers for wealthy farmers, whilst some smallholders have to depend on the vagaries of rain to grow their crops. See UNDP *Human Development Report 2006: Beyond Scarcity—Power, poverty and the Global Water Crisis 2*.

<sup>471</sup> See generally UNDP *Human Development Report 2006: Beyond Scarcity—Power, poverty and the Global Water Crisis*.

<sup>472</sup> Murthy 2013 *Berkeley Journal of International Law* 89.

<sup>473</sup> Murthy 2013 *Berkeley Journal of International Law* 89.

<sup>474</sup> Murthy 2013 *Berkeley Journal of International Law* 89.

<sup>475</sup> Bakker 2007 *Antipode* 437.

<sup>476</sup> Bakker 2007 *Antipode* 437.

Conventions based on assumed availability of water (such as the right to health, and the right to food, amongst others).<sup>477</sup>

With the above in mind, determining the exact meaning of the right to water may be complex. This is so since, for instance, the concept may be referred to under different terms. For instance, in 2010, the UN GA and HRC explicitly referred to the right to "safe drinking water",<sup>478</sup> although the phrase "the human right to water" is frequently used interchangeably. Despite the references made in General Comment 15 as to water for subsistence agriculture, it may be held that the contemporary comprehension of the human right to water is centralised primarily on safe water for drinking, for general domestic and household needs, and for sanitation, implicating its origins in the right to health.<sup>479</sup>

According to Thielbörger, there is a lack of clarity concerning the concept of the right to water internationally.<sup>480</sup> The author argues that the conceptualisation of this right requires more attention since sweeping the conceptual shortcomings of this right under the proverbial carpet could undermine its legal credibility in the long term.<sup>481</sup> Furthermore, Thielbörger argues that the primary problem in this regard stemmed from the 1960s when both the ICCPR and the ICESCR were drafted without mention of the right to water.<sup>482</sup>

Two contrasting conclusions may be derived from this omission.<sup>483</sup> Firstly, the omission could be viewed as an expression of deliberate silence, which expresses states' possible unspoken consensus that water should not be recognised as a human right.<sup>484</sup> Alternatively, the omission could indicate "negligent silence", meaning that the drafters simply forgot to include it in the aforementioned documents.<sup>485</sup>

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<sup>477</sup> Bakker 2007 *Antipode* 437.

<sup>478</sup> UN GA Res 64/292 (2010); HRC Res 15/9 (2010).

<sup>479</sup> Murthy 2013 *Berkeley Journal of International Law* 116.

<sup>480</sup> Thielbörger 2015 *Human Rights Law Review* 227.

<sup>481</sup> Thielbörger 2015 *Human Rights Law Review* 227.

<sup>482</sup> Thielbörger 2015 *Human Rights Law Review* 227.

<sup>483</sup> Thielbörger 2015 *Human Rights Law Review* 227.

<sup>484</sup> Tully 2005 *Netherlands Quarterly of Human Rights* 37 – 38.

<sup>485</sup> Craven "Some Thoughts on the Emergent Right to Water" 37.



Thus, Bulto posits that the normative terrain that underlies the human right to water is still muddled, with academic literature significantly contributing to the prevailing confusion as to the right to water.<sup>486</sup> Bulto goes as far as to say that the latter also provides some credence to the reluctance of many states to explicitly recognise and implement the right to water domestically.<sup>487</sup> This is underscored by the trend observed during the passing of the resolution that recognised water as a human right, where positive votes were obtained from 122 states, while 41 states abstained,<sup>488</sup> in the belief that they should not owe any legal obligation to guarantee the right to water for their communities. This allows states room to manoeuvre in terms of realising the right, but also means that, lacking formal recognition of the right, the obligations on states to protect, fulfil and respect the right to water do not apply.<sup>489</sup> As such, communities may struggle to have their rights seen to where access to water is concerned, or to have the violation thereof remedied.<sup>490</sup>

Nevertheless, considering the current nature of the right to water, one may employ two approaches to conceptualise the right to water derived from the international perspective. The first approach entails viewing the right to water as a derivative treaty right. Authors such as McGraw,<sup>491</sup> Murthy,<sup>492</sup> Thielbörger,<sup>493</sup> Bulto,<sup>494</sup> and Cavallo<sup>495</sup> observe that the aforementioned approach seems to be the currently prevailing opinion in international legal scholarship. The derivative approach may be understood as inferring one right from another. Accordingly, the derivative right must, of course, share the legal features of its source right.<sup>496</sup>

The CESCR (tasked with drafting General Comment 15) indicated that the human right to water should be derived from article 11, which ensures the right to an adequate

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<sup>486</sup> Bulto "The human right to water at the global level" 28 – 29.

<sup>487</sup> Bulto "The human right to water at the global level" 28 – 29.

<sup>488</sup> UN GA Res 64/292 (2010).

<sup>489</sup> Bulto "The human right to water at the global level" 28 – 29.

<sup>490</sup> Bulto "The human right to water at the global level" 28 – 29.

<sup>491</sup> McGraw 2010 *Loyola University Chicago International Law Review* 137.

<sup>492</sup> Murthy 2013 *Berkeley Journal of International Law* 109, 147.

<sup>493</sup> Thielbörger 2015 *Human Rights Law Review* 228.

<sup>494</sup> Bulto 2011 *Melbourne Journal of International Law* 314.

<sup>495</sup> Cavallo 2012 *Pace International Law Review Online Companion* 199 – 200.

<sup>496</sup> Cahill 2005 *The International Journal of Human Rights* 389.

standard of living.<sup>497</sup> The wording of article 11 specified that state parties recognise an adequate standard of living for everyone, "including adequate food, clothing, and housing", which provides an exemplary, rather than an exhaustive list of elements for the fulfilment of this right.<sup>498</sup> From the wording employed in General Comment 15, it is apparent that the right to an adequate standard of living was utilised as the source right for the recognition of the human right to water.

The World Bank concurs with this interpretation but holds that the CESCR went further than deriving the right from article 11 of the ICESCR.<sup>499</sup> Accordingly, the World Bank states that the CESCR "inferred" the right to water from article 12 of the ICESCR, wherein state parties recognise everyone's right to the enjoyment of the highest attainable standard of mental and physical health.<sup>500</sup> It is said that the CESCR also tied the human right to water to the other rights protected in the International Bill of Human Rights, "foremost amongst them the right to life and human dignity."<sup>501</sup>

Thielbörger<sup>502</sup> holds that the above understanding of the human right to water is underpinned in the UN HRC's 2010 resolution on the human right of access to safe drinking water and sanitation.<sup>503</sup> The resolution echoes the above view by stating that the human right to water is inextricably related to the right to the highest attainable standard of both physical and mental health, as well as the right to human dignity and to life.<sup>504</sup> Lastly, Thielbörger adds that the lack of an explicit treaty recognition allows one to view the right to water as an amalgamated derivative right, which covers the different elements of other accepted rights in treaty law (instead of only one).

Notably, early scholarly perspectives on the human right to water pursued, to some extent, the approach of derivation and inference. For instance, McCaffrey,<sup>505</sup> after

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<sup>497</sup> Art 3 of General Comment 15.

<sup>498</sup> Art 3 of General Comment 15.

<sup>499</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 57.

<sup>500</sup> The CESCR held that the right to water is inextricably related to the right enshrined in article 12; see Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 57.

<sup>501</sup> Salman and McInerney-Lankford *The Human Right to Water: Legal and Policy Dimensions* 57.

<sup>502</sup> Thielbörger 2015 *Human Rights Law Review* 227.

<sup>503</sup> UN GA Res 64/292 (2010); HRC Res 15/9 (2010).

<sup>504</sup> HRC Res 15/9 (2010) para 3.

<sup>505</sup> McCaffrey 1992 *Geo Intl Envtl L Rev* 13.

indicating the lack of recognition of the right to water under both the UDHR and the ICESCR, put forward the argument that, if there is a recognisable right to water under the basic instruments of international human rights law, it "must be inferred". On a similar note, Gleick<sup>506</sup> postulated that:

As with the UDHR, access to water can be inferred as a derivative right accessory to meet the explicit rights to health and adequate standard of life.

The second approach, which may be used to conceptualise the right to water, is to rely on its "invigorated status as part of international custom". Although the customary law status of the right to water has, in recent years, been reinforced, the overall opinion in international scholarship remains that the right to water does not yet form part of international custom, primarily due to insufficient state practice. Nevertheless, Thielbörger puts forward the argument that the strengthened legal conviction (*opinion juris*) of states in favour of a human right to water may enable one to view the particular right as part of customary international law.

To fully grasp the meaning of the right to water, it is necessary to view the right through a socio-economic lens, given that the right is currently identified as such. McGraw holds that, primarily, the socio-economic right to water is derived from article 11(1) of the ICESCR, which provides for the right to an adequate standard of living, and is viewed as the "central legal basis for the right".<sup>507</sup> However, the socio-economic right to water is furthermore linked to the fulfilment of rights in articles 11(2)<sup>508</sup> and 12(1)<sup>509</sup> of the ICESCR.<sup>510</sup>

Therefore, water as a right is appropriately interpreted as essential for the enjoyment of the so-called "welfare" rights within the ICESCR.<sup>511</sup> It is said that the aforementioned

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<sup>506</sup> Gleick 1998 *Water Policy* 492.

<sup>507</sup> McGraw 2011 *Loyola University Chicago International Law Review* 148.

<sup>508</sup> Art 11(2) of the ICESCR holds that: 'The States Parties to the present Covenant, recognizing the fundamental right of everyone to be free from hunger, shall take, individually and through international cooperation, the measures, including specific programmes, which are needed...'

<sup>509</sup> Art 12(1) of the ICESCR states: 'The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.'

<sup>510</sup> McGraw 2011 *Loyola University Chicago International Law Review* 148.

<sup>511</sup> McGraw 2011 *Loyola University Chicago International Law Review* 148.

rights generally require both negative and positive state action.<sup>512</sup> The differentiation between positive and negative rights seems to be the accepted paradigm internationally. However, it is not without critique, particularly by the author Ulrich,<sup>513</sup> who holds that the distinction between such rights is puzzling. The author postulates that this is so since ethically speaking, differentiating between positive and negative rights only carries weight if the concepts action and omission are respectively allocated differentiating moral values.<sup>514</sup> In reality, protecting negative rights will always compel or require certain positive actions.<sup>515</sup> Thus, in application, the resources ultimately needed to fulfil any specific right will depend upon such a right, in addition to the context within which it must be realised, instead of its positive or negative classification.<sup>516</sup>

Moreover, the juxtaposition of the civil and political rights, and the socio-economic rights in the ICCPR and ICESCR, along with the obligations they exert on states, demonstrate that the rights are distinct and founded on more than merely a positive or negative classification.<sup>517</sup> Indeed, Dennis and Stewart,<sup>518</sup> posit that a primary difference between these rights is that civil and political rights may be fulfilled by merely passing legislation. Keener and Vasquez<sup>519</sup> persist that the supposed demand of ICESCR related rights on state resources has become an "excuse for inaction".

The justiciability of socio-economic rights was disputed in the past.<sup>520</sup> However, case law has proven that the state's obligations to respect, protect, and fulfil these rights are

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<sup>512</sup> Isiah Berlin addressed negative and positive rights (or liberties) for the first time in 1958; see Berlin *Four Essays on Liberty* 118 – 172. Negative rights entail not to be subjected to an action of another group or person, hence, negative rights permit or oblige inaction. Negative rights are usually associated with the first generation of rights. Thus, the State is not permitted to take away one's right to life. On the other hand, a positive right entails to be subjected to an action by a group or person, hence, positive rights allow or oblige action. Positive rights are generally associated with the second – and third generation of rights. Accordingly, the right to social welfare confers the obligation on a state to provide services. See Globalization 101 2017 <http://www.globalization101.org/negative-vs-positive-rights/>. For more on the theory of positive and negative rights, see Freedman 1990 *Ethics* 189 – 502.

<sup>513</sup> Ulrich 2015 *Geo Wash Intl L Rev* 52.

<sup>514</sup> Shue *Basic Rights: Subsistence, Affluence, and U.S. Foreign Policy* 37; Ulrich 2015 *Geo Wash Intl L Rev* 52.

<sup>515</sup> Ulrich 2015 *Geo Wash Intl L Rev* 52.

<sup>516</sup> Ulrich 2015 *Geo Wash Intl L Rev* 52.

<sup>517</sup> Ulrich 2015 *Geo Wash Intl L Rev* 52.

<sup>518</sup> Dennis and Stewart 2004 *AJIL* 482.

<sup>519</sup> Keener and Vasquez 2009 *Colum Hum Rts L Rev* 595, 599.

<sup>520</sup> McGraw 2011 *Loyola University Chicago International Law Review* 148.

judicially enforceable.<sup>521</sup> In fact, the authors Puta-Chekwe and Flood<sup>522</sup> describe the argument that socio-economic rights are unenforceable as one of the greatest misconceptions in modern human rights advocacy.

Commonly, socio-economic rights involve the idea of the "core content" of such rights. Fundamentally, the idea of a "core content" suggests that there are certain degrees of rights fulfilment. At least one of these degrees is a basic, definable threshold, also understood as the "minimum legal content" of a socio-economic right.<sup>523</sup> The modern manifestation of the minimum core concept is found in General Comment 3, wherein the CESCR clarifies the meaning of the term "progressive realisation" as it concerns state obligations.<sup>524</sup> It is stated in General Comment 3 that the phrase "progressive realisation" must be read with the overall objective of the ICESCR in mind, which is to determine clear obligations for state parties concerning the fulfilment of the rights in question.<sup>525</sup> Moreover, it holds that a duty is imposed on states to move as expeditiously and effectively as possible towards the realisation of the aforementioned goal.<sup>526</sup>

In an attempt to clarify such obligations on states, the idea of a right's minimum core is introduced. Likewise, article 10 of General Comment 3 holds the following:<sup>527</sup>

... the Committee is of the view that a minimum core obligation to ensure the satisfaction of, at the very least, minimum essential levels of each of the rights is incumbent upon every State party.

As can be inferred from above, it is not attempted in General Comment 3 to exhaustively define the exact content of the "minimum essential level" for any of the socio-economic

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<sup>521</sup> COHRE *Legal Resources for the Right to Water and Sanitation: International and National Standards* 7; McGraw 2011 *Loyola University Chicago International Law Review* 148.

<sup>522</sup> Puta-Chekwe and Flood "From Division to Integration: Economic, Social and Cultural Rights as Basic Human Rights" 39.

<sup>523</sup> The concept is also interchangeably referred to as the "minimum core", "minimum legal content", and "minimum legal standard". Transnational and non-judicial actors have played the largest role in defining the concept's content, yet the concept concretely relies on law for its basis and effect. See Young 2008 *Yale J Intl L* 113, 123, and 125.

<sup>524</sup> Art 9 of CESCR General Comment No 3: The Nature of States Parties' Obligations UN Doc E/1991/23 (1990).

<sup>525</sup> Art 9 of CESCR General Comment No 3: The Nature of States Parties' Obligations UN Doc E/1991/23 (1990).

<sup>526</sup> Art 9 of CESCR General Comment No 3: The Nature of States Parties' Obligations UN Doc E/1991/23 (1990).

<sup>527</sup> Art 10 of CESCR General Comment No 3: The Nature of States Parties' Obligations UN Doc E/1991/23 (1990).

rights to which it refers.<sup>528</sup> Instead, subsequent General Comments provide content to the minimum core of certain socio-economic rights, such as General Comment 15 pertaining to the right to water. The CESCR remained cognisant of the resource constraints of especially developing countries upon the construction of the minimum core concept in General Comment 3, and thus placed a resource limitation on the use of the minimum core.<sup>529</sup> Arguably the most important aspect brought forward by the minimum core concept in General Comment 3, as per McGraw, is that the minimum core not only enables the determination of the acceptability of state initiatives, but it furthermore strengthens the justiciability of socio-economic rights, in particular, in national courts.<sup>530</sup>

Subsequent to the UN HRC recognising the human right to safe and clean drinking water, it is rightly stated by Angel and Loftus<sup>531</sup> that the state is paradoxically positioned at the centre of struggles related to water justice. This repositioning of the state entails, as expressed by De Albuquerque,<sup>532</sup> that the potential success of the human right to water as a "legislative framework" relies on communities' ability to make effective demands on the state as to the fulfilment of this right. The importance of the state being held legally accountable to its communities, in order for the human right to water to be realistically attained, is being highlighted globally. This is so, considering that every nation-state is expected to implement a plan of action for the realisation of the right to water, in addition to reporting on its progress in this regard.<sup>533</sup>

It is suggested that the narratives between state and society have always been inextricably intertwined with water provision.<sup>534</sup> This is because states are generally expected, at the minimum, to provide rudimentary water and sanitation services to persons.<sup>535</sup> Alternatively, state failure may accordingly be measured by a lack of ability to

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<sup>528</sup> McGraw 2011 *Loyola University Chicago International Law Review* 157.

<sup>529</sup> Art 10 of CESCR General Comment No 3: The Nature of States Parties' Obligations UN Doc E/1991/23 (1990).

<sup>530</sup> McGraw 2011 *Loyola University Chicago International Law Review* 157.

<sup>531</sup> Angel and Loftus 2019 *Geoforum* 206.

<sup>532</sup> Catarina de Albuquerque is a former UN Special Rapporteur on the human right to water; see generally De Albuquerque *Realizing the Human Rights to Water and Sanitation: A Handbook*.

<sup>533</sup> Angel and Loftus 2019 *Geoforum* 206.

<sup>534</sup> Rodina and Harris 2016 *Water Altern* 336 – 355.

<sup>535</sup> Rodina and Harris 2016 *Water Altern* 336 – 355.

deliver adequate services to communities.<sup>536</sup> Nonetheless, some authors postulate that a risk exists for water justice-struggles to ensue in the reification<sup>537</sup> of the state.<sup>538</sup> A "thing" capable of attaining change in its own right might be borne from what is in reality a complex set of social relations.<sup>539</sup>

Before the formal recognition of water as a human right, both authors and water stakeholders proposed the commodification or privatisation of water. Proponents of this approach argue that the privatisation<sup>540</sup> of water services will increase efficiency, and ensure that water services are delivered to those who have no access thereto.<sup>541</sup> It is argued that private companies will be able to increase efficiency and performance, lower costs, improve cost recovery, which may allow for the upgrading and expansion of systems.<sup>542</sup> The aforementioned improvements are inevitably critical in a world where millions still lack access to a basic water supply, but the privatisation-approach is certainly not without criticism.

In fact, various authors put forward that the so-called "neo-liberalisation" of water entails the "act of dispossession with negative distributive consequences" that may be seen as symbolic of "globalisation from above".<sup>543</sup> Opponents to the privatisation of water services offer the argument that the involvement of private companies presents a "pernicious logic of the market into water management", which is viewed as being incompatible with ensuring communities' right to water. Whereas authors such as Rogers, De Silva, and

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<sup>536</sup> Angel and Loftus 2019 *Geoforum* 207.

<sup>537</sup> Reification entails the alteration of something abstract, such as ideas or thoughts, into something concrete and real; see Cambridge Dictionary 2020 <https://dictionary.cambridge.org/dictionary/english/reification>.

<sup>538</sup> Angel and Loftus 2019 *Geoforum* 207.

<sup>539</sup> Angel and Loftus 2019 *Geoforum* 207.

<sup>540</sup> Privatisation entails transferring ownership of water supply services to private companies, in conjunction with private sector partnerships which provide for the construction, management and operation of state owned water supply systems by privately owned companies. It is held that this form of utility management has worked well in other utility sectors; see generally Dinar *The Political Economy of Water Pricing Reforms*; Rogers, De Silva and Bhatia 2002 *Water Policy* 1 – 17; Wimpenny *Financing Water for All: Report of the World Panel on Financing Water Infrastructure*; Shirley *Thirsting for Efficiency*.

<sup>541</sup> Bakker 2007 *Antipode* 436.

<sup>542</sup> Bakker 2007 *Antipode* 436 – 437.

<sup>543</sup> Assies 2003 *Latin American Perspectives* 31 – 34; Bond 2004 *Capitalism Nature Socialism* 7 – 25; see generally Barlow and Clarke *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water*.

Bhatia<sup>544</sup> hold that water pricing, in particular, may promote equity, efficiency, and sustainability, others postulate that private companies, who are answerable to shareholders and with the dominant goal of profit in mind, will result in the less sustainable management of water supplies.<sup>545</sup>

Estache and Rossi<sup>546</sup> postulate that, for instance, private-sector alternatives are not always more efficient but often result in expensive and potentially unaffordable pricing regimes for users. Bakker holds that opponents of privatisation promote the effectiveness of democratic accountability to communities compared to corporate accountability to shareholders.<sup>547</sup> Even before the human right to water was explicitly recognised, anti-privatisation advocates invoked the argument that the absolute necessity of water for life, and the dependence of various other basic rights on access to water, promotes the existence of a self-evident human right to water.<sup>548</sup> Consequently, the anti-privatisation campaign culminated in a reinvigorated movement for the eventual recognition of the right to water.<sup>549</sup>

This leads one to the question: where do we stand now on this debate? Following an understanding exemplified by Moyo,<sup>550</sup> privatisation may be understood as a "change in the role and responsibilities of the state" instead of simply a change in ownership. Accordingly, the aforementioned may be described as a broad understanding of privatisation. This view stands in contrast to the limited understanding thereof, which encompasses only a complete transfer of assets from the public to the private sector.<sup>551</sup> Rolling back the state and relying on the market as the distributor of basic goods and services has become an international trend in the last two decades.<sup>552</sup> Subsequently,

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<sup>544</sup> Rogers, De Silva, and Bhatia 2002 *Water Policy* 1.

<sup>545</sup> See Bakker 2007 *Antipode* 437.

<sup>546</sup> Estache and Rossi 2002 *World Bank Economic Review* 139 -148.

<sup>547</sup> Bakker 2007 *Antipode* 437.

<sup>548</sup> Gleick 1998 *Water Policy* 487 – 503; see generally Morgan "Social protest against privatization of water: Forging cosmopolitan citizenship?".

<sup>549</sup> Activists for the human right to water obtained support from several major international agencies, such as the WHO, and the UNDP; see Bakker 2007 *Antipode* 438.

<sup>550</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 448.

<sup>551</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 448.

<sup>552</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 443.



Moyo<sup>553</sup> holds that the state is no longer considered the provider, but the regulator of various services. Evidently, whether opposing, advocating for, or seeking a balanced approach regarding the privatisation of water services, the state will remain central to the perpetual debates surrounding water justice.

However, several legal instruments have identified local governments as being instrumental in implementing the right to water.<sup>554</sup> This is because the implementation of the right to water necessitates a clear definition of the right, along with the identification of obligations and duties associated therewith concerning certain stakeholders. It also requires the identification of authorities to oversee the implementation of the right and the allocation of adequate financial and human capacity.<sup>555</sup> Although this could be achieved by national means, local authorities are often well-suited to, for instance, develop clear policies and assume responsibility for functions such as water service delivery. Hence, the right may, arguably, be implemented with improved efficacy.<sup>556</sup> This entails that the initiatives of local authorities should be supported, and that community participation should be fostered to accurately respond to the needs of a particular community in regards to the right to water.<sup>557</sup>

According to the UN, local authorities are essential not only for the execution of the right to water, but also to safeguard its implementation.<sup>558</sup> The UN postulates that this is so, since local authorities often have a major role to play in, e.g., funding solutions for providing access to water.<sup>559</sup> Involving local authorities in the realisation of the right to water may also be fruitful in terms of solving complex issues, such as the disconnect between the internationally recognised right to water, and the ground-level determinants of both water access and reliability.<sup>560</sup>

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<sup>553</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 443.

<sup>554</sup> See para 2.3.1 above.

<sup>555</sup> See para 2.3.1 above.

<sup>556</sup> The World Water Council *The Right to Water: From Concept to Implementation* vi.

<sup>557</sup> The World Water Council *The Right to Water: From Concept to Implementation* vi. See Moschell 2020 *Journal of Transnational Law & Policy* 208 – 209.

<sup>558</sup> World Water Council *The Right to Water: From Concept to Implementation* 17.

<sup>559</sup> World Water Council *The Right to Water: From Concept to Implementation* 17.

<sup>560</sup> Acey 2017 *Berkeley Planning Journal* 12. For an analysis of the implementation of the right to water in the international sphere, see generally Baer and Gerlak 2015 *Third World Quarterly*.

Carrard *et al* are of the opinion that while local governments may bear the primary responsibility for ensuring everyone has access to water services, it is necessary for the human right to water to become a part of the daily practice of local authorities.<sup>561</sup> This is to ensure that the human right to water moves from recognition to realisation. Puzzlingly, the potential for the human right to water to practically inform the efforts of local governments towards sustainable and inclusive service delivery has received minimal attention to date.<sup>562</sup> Instead, the human right to water discourse seems to focus more on national and international levels, or on the improving of the capacity of rights-holders to stake a claim to their rights from the government.<sup>563</sup> Arguably, this is, therefore, an area that should receive more scholarly attention, since there is significant opportunity for considering how human rights may inform the efforts of local governments in a constructive manner to yield improved service provision.<sup>564</sup>

The next section of this chapter seeks to address the African regional perspectives on the right to water, and will proceed in much the same manner as the international section thereon. Hence, the law and policy, judicial decisions, and scholarly discourse on the African regional perspective of the human right to water will be discussed in turn.

## **2.4 African regional perspectives**

Africa is faced with rapidly increasing water scarcity. The continent is losing 5% of its GDP as a result of poor water and sanitation infrastructure, another 2% to power outages, approximately 5 – 25% to floods and droughts, and conceivably a further 5% to the future impact of climate change.<sup>565</sup> Hence, access to clean water and sanitation has been earmarked as the "most crucial resource for life and agriculture and industry".<sup>566</sup>

Unfortunately, the right to water is not recognised as an individual right in the African region, but rather a right that is implied by the protection in terms of other human

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<sup>561</sup> Carrard *et al* 2020 *Water* 1.

<sup>562</sup> Carrard *et al* 2020 *Water* 2.

<sup>563</sup> Carrard *et al* 2020 *Water* 1.

<sup>564</sup> See generally Carrard *et al* 2020 *Water*.

<sup>565</sup> African Studies Centre Leiden 2017 <https://www.ascleiden.nl/content/webdossiers/water-africa#Water%20in%20Africa:%20introduction>.

<sup>566</sup> African Studies Centre Leiden 2017 <https://www.ascleiden.nl/content/webdossiers/water-africa#Water%20in%20Africa:%20introduction>.

rights.<sup>567</sup> As was the case for many years in the international context, this derivative nature of the right affects uptake of the right domestically, as will be elaborated on below. The narrative on the right to water in the African-regional context is not as extensive as the international perspectives on the subject. Nonetheless, this section seeks to discuss the African regional law and policy perspective on the right to water. The latter is necessary to understand the development of the right to water in the African regional context, as well as to determine the content of the right in this context. Some of the judicial decisions pertaining to the right to water in the African regional context will be discussed to determine how the courts have interpreted the right, especially given the right's derivative nature. Finally, some scholarly perspectives concerning the right in the African regional milieu will be investigated to further elucidate the meaning of the right, and to identify the role-players and actions necessary for its fulfilment.

#### ***2.4.1 The legal architecture***

As mentioned above, the first section of this analysis will investigate the legal instruments that contributed to the recognition of the right to water, albeit impliedly, in the African regional context. In doing so, the content of the right within this perspective will be highlighted. Additionally, by analysing the envisioned instruments, some light may be shed on who is responsible for the fulfilment of this right and what actions may be considered necessary for the right to be realised from an African regional perspective.

##### *2.4.1.1 The African Charter on Human and Peoples' Rights*<sup>568</sup>

The ACHPR is a human rights instrument that aims to promote human rights on the continent. It may be regarded as distinctive in its attempt to bring an African "touch" to the discourse on human rights.<sup>569</sup> In fact, the ACHPR is the only regional human rights instrument that views economic and social rights on the same footing as the civil and

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<sup>567</sup> See para 2.4.1.5 below.

<sup>568</sup> *The African Charter on Human and Peoples' Rights* (1982).

<sup>569</sup> Mutua 1995 *Virginia Journal of International Law* 339.

political rights recognised in the same text.<sup>570</sup> The aforementioned may be gathered from the preamble of the ACHPR, which provides the following:<sup>571</sup>

...civil and political rights cannot be dissociated from economic, social and cultural rights in their conception as well as universality and that the satisfaction of economic, social and cultural rights is a guarantee for the enjoyment of civil and political rights ...

Additionally, the ACHPR goes further by recognising that freedom, equality, justice, and dignity are integral to the development of African people.<sup>572</sup> The ACHPR recognises the right of everyone to the best attainable state of physical and mental health.<sup>573</sup> The aforementioned right is similar to article 12 of the ICESCR, from which, in international law, the right to water has mainly been inferred.<sup>574</sup> Although no explicit mention is made of the right to water in this instrument, it is generally conceded that this right is implied in the ACHPR, and may be derived from a combination of socio-economic rights. Firstly, the ACHPR recognises the right to a satisfactory environment that is favourable to one's development.<sup>575</sup> Secondly, article 5 of the ACHPR provides for the right to dignity, and article 16 establishes the right to health. Article 4 determines that every human is entitled to respect for one's life and the integrity of one's person.<sup>576</sup> The *Africa Water Vision 2025* explicitly recognises that water is a precious resource, vital for life, the environment, and development.<sup>577</sup> As such, the right to life also provides an essential measure from which the right to water may be derived.<sup>578</sup> Finally, the ACHPR provides that every individual shall have the right of access to public property and *services* in strict equality of all persons before the law.<sup>579</sup>

From the above, one may conclude that the relevant provisions of the ACHPR are integral in providing for at least a derivative right to water in the African regional context. This

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<sup>570</sup> See the preamble to the ACHPR; Mutua 1995 *Virginia Journal of International Law* 339.

<sup>571</sup> Preamble to the ACHPR.

<sup>572</sup> See the preamble to the ACHPR.

<sup>573</sup> Art 16 of the ACHPR.

<sup>574</sup> See para 2.3.3.1 above.

<sup>575</sup> Art 24 of the ACHPR.

<sup>576</sup> Bulto "The human right to water in the African human rights system" 70.

<sup>577</sup> The *Africa Water Vision for 2025: Equitable and Sustainable Use of Water for Socioeconomic Development* (2009) 3.

<sup>578</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 51.

<sup>579</sup> Art 13(3) of the ACHPR.

reasoning is substantiated by that of the African Commission on Human and People's Rights in its deliberations in various cases, which are analysed below.<sup>580</sup> While the Commission, acting as the monitoring and enforcement mechanism of the ACHPR, made strides in the right direction, it has, to date, failed to comprehensively deliberate on the legal basis and scope of the human right to water and the associated obligations of state parties under the ACHPR.<sup>581</sup>

The Charter prescribes certain actions relevant to the right to water. The ACHPR explicitly provides that the member states of the Organisation of African Unity who are party to this Charter shall recognise the duties, rights and freedoms therein.<sup>582</sup> Furthermore, the member states are required to adopt legislative and other measures to give effect to the duties, rights and freedoms in the Charter.<sup>583</sup> State parties must also recognise the duty to guarantee the independence of courts, and allow the development and improvement of appropriate national institutions that are entrusted with both the protection and promotion of all of the rights and freedoms guaranteed in the ACHPR.<sup>584</sup> As such, the ACHPR recommends legislative and judicial measures to guarantee and protect the rights in the Charter.

While no clarity is provided as to how these actions apply to the rights implied in the ACHPR, one may argue that the prescribed actions are also valuable towards, for instance, interpreting what is required from states in regards to fulfilling the right to water. This is because the rights in the ACHPR, as with all rights recognised both in the African regional and international contexts, are meant for domestic implementation.<sup>585</sup> Hence, states with their numerous laws, institutions and domestic procedures bear the main brunt of responsibility in terms of translating treaty-based rights into the domestic sphere of reality.<sup>586</sup> As such, should a state accept the right to water into its domestic

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<sup>580</sup> See para 2.4.2 below.

<sup>581</sup> See para 2.4.2 below; Bulto "The human right to water in the African human rights system" 67.

<sup>582</sup> Art 1 of the ACHPR.

<sup>583</sup> Art 1 of the ACHPR.

<sup>584</sup> Art 26 of the ACHPR.

<sup>585</sup> Bulto "The human right to water and states' domestic obligations" 87.

<sup>586</sup> Bulto "The human right to water and states' domestic obligations" 87.

law, it may utilise the actions prescribed by the ACHPR to guarantee and protect the right.

#### *2.4.1.2 The African Charter on the Rights and Welfare of the Child*<sup>587</sup>

The *African Charter on the Rights and Welfare of the Child* (hereafter the ACRWC) remains one of the first regional human rights instruments to explicitly include provisions concerning the right to water.<sup>588</sup> As per article 14 of the ACRWC, every child enjoys the right to the best attainable state of physical, mental, and spiritual health. Hence, an obligation is placed on the state parties to "pursue the full implementation of this right".<sup>589</sup>

Part of the measures in fulfilment of the aforementioned right includes the guarantee to ensure the provision of adequate nutrition and safe drinking water to every child.<sup>590</sup> As with the provisions under the CRC above,<sup>591</sup> this African regional instrument also links the right to health to access to safe drinking water. Consequently, in line with the ACHPR, the interdependence of rights is evident within the regional rights instruments, as with the international law and policy instruments discussed above.<sup>592</sup> Notably, while the ACRWC does not make provision for the right to safe water for everyone, but only for children specifically, it nonetheless contributes to the normative content of the right to water in the African regional context. This is so because it stipulates which category of water is necessary for the implementation of the right, namely water for drinking, and also necessitates that it should be *safe*. It also implicitly provides that the right to water should be safeguarded for vulnerable groups, such as children.

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<sup>587</sup> *The African Charter on the Rights and Welfare of the Child* (1990).

<sup>588</sup> See art 14 of the ACRWC.

<sup>589</sup> Art 14(2) of the ACRWC.

<sup>590</sup> See art 14(1)(c) of the ACRWC.

<sup>591</sup> See art 2.3.1.4 above.

<sup>592</sup> See para 2.3.1 above.

### *2.4.1.3 The Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa*<sup>593</sup>

The adoption of the *Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa* (hereafter the PWRA) is considered instrumental in the regional "right to water" debate. Much like CEDAW,<sup>594</sup> it provides for women's right of access to water. Interestingly, this right is provided for under article 15 of the PWRA, which holds that state parties must ensure that women have the right to nutritious and adequate food. As part of the measures to attain the aforementioned right, it is explicitly said that states should provide women with access to clean drinking water.<sup>595</sup> Albeit only applying to women, unlike in the CEDAW, it is not only limited to rural women.<sup>596</sup> Similar to the ACRWC, the PWRA also contributes to the normative content of the right to water in the African regional context, and identifies women as another vulnerable group for whom the right to water must be safeguarded.

Therefore, upon its inception in the year 2003, it was cited to support the existence of a right to water in international law.<sup>597</sup> Again, while still developing internationally, the importance of the right is provided with great endorsement regionally, since it is enshrined in a legally binding instrument. Moreover, given the fact that it is both linked to the right to food, and the right is qualified through the inclusion of "clean" drinking water, one may, again, infer that various rights depend on the fulfilment of the right to water.

Notably, several actions are identified that are relevant to securing the right to water and its implementation. According to section 26 of the PWRA, state parties must ensure the implementation of the Protocol at the national level, as well as indicate the legislative and other measures undertaken for the full realisation of the particular right in question. Even more, the state is obliged to provide budgetary and other resources for the full and

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<sup>593</sup> *The Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa* (2000).

<sup>594</sup> See para 2.3.1.3 above.

<sup>595</sup> Art 15(a) of the PWRA.

<sup>596</sup> See para 2.3.1.3 above.

<sup>597</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 52.

effective implementation of the rights guaranteed by the protocol.<sup>598</sup> From this, one may infer that states are required to take specific positive steps towards the realisation of the rights contained in the PWRA, including the right to water.

#### *2.4.1.4 Abuja Ministerial Declaration on Water: African Ministers' Council and African Water Facility*

In 2002, African Ministers met in Nigeria and adopted the *Abuja Ministerial Declaration on Water* (hereafter the Abuja Declaration).<sup>599</sup> From this, two new Pan-African entities were created, namely the African Ministers Council on Water (hereafter AMCOW)<sup>600</sup> and the African Water Facility (hereafter AWF).<sup>601</sup> The purpose of these entities is to stress the urgency of the need to address Africa's precarious water dilemma.<sup>602</sup>

The Abuja Declaration also highlighted the fact that Africa has a high number of people who lack access to adequate amounts of clean water.<sup>603</sup> The Declaration notes the uneven distribution of water resources, the high levels of water pollution, and the misconception by people on the continent that there exists an endless supply of water in Africa.<sup>604</sup> The Abuja Declaration states that an adequate supply of freshwater is the "most important prerequisite" for sustaining the lives of all humans, for preserving ecosystems that support all life, and for attaining sustainable development.<sup>605</sup> Consequently, this declaration was dubbed the so-called "key to sustainability".<sup>606</sup>

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<sup>598</sup> Art 26 of the PWRA.

<sup>599</sup> *Abuja Declaration on Water: A Key to Sustainable Development in Africa* (2002).

<sup>600</sup> The prime directive of AMCOW is to "promote cooperation, security, social and economic development and poverty eradication among member states through the effective management of the continent's water resources and provision of water supply services". See AMCOW 2016 [https://www.amcow-online.org/index.php?option=com\\_content&view=article&id=124&Itemid=126&lang=en](https://www.amcow-online.org/index.php?option=com_content&view=article&id=124&Itemid=126&lang=en).

<sup>601</sup> AWF is an initiative of AMCOW, and is hosted by the African Development Bank. Overall, the objective of AWF is to provide assistance to African countries in order to mobilise and apply resources, so as to enable the water and sanitation sector to help enable them to successfully implement both the *Africa Water Vision* (2025), and to meet MDG 7.C; see AMCOW 2016 [https://www.amcow-online.org/index.php?option=com\\_content&view=article&id=59%3Athe-african-water-facility&catid=50%3Ademo-content&Itemid=88&lang=en](https://www.amcow-online.org/index.php?option=com_content&view=article&id=59%3Athe-african-water-facility&catid=50%3Ademo-content&Itemid=88&lang=en).

<sup>602</sup> The entities were established in 2002 and 2006 respectively. See AMCOW 2016 [https://www.amcow-online.org/index.php?option=com\\_content&view=article&id=124&Itemid=126&lang=en](https://www.amcow-online.org/index.php?option=com_content&view=article&id=124&Itemid=126&lang=en).

<sup>603</sup> Para 143 of the Abuja Declaration.

<sup>604</sup> Para 143 of the Abuja Declaration.

<sup>605</sup> Para 4(a) of the Abuja Declaration.

<sup>606</sup> Para 1 of the Abuja Declaration.



The Abuja Declaration may be seen as contributing the element of sustainability to the right to water-discourse, and is essential to the right to water insofar it provides for the protection and management of water resources. For instance, the Declaration mentions that the primary responsibility for ensuring both equitable and sustainable management of water resources in Africa rests with governments and their people.<sup>607</sup> It also emphasises that the Ministers who have been allocated the responsibility for water resources in a country have a special role to play.<sup>608</sup> The Declaration's relevance in this regard lies in its augmentation of the understanding of the right to water by emphasising the need for sustainability and water resource management, and by identifying the relevant stakeholders necessary for water resource management.

#### *2.4.1.5 The Principles and Guidelines on the Implementation of Economic, Social and Cultural Rights in the African Charter on Human and Peoples' Rights*<sup>609</sup>

Given the lack of explicit recognition provided by the ACHPR concerning the right to water, the subsequent *Principles and Guidelines on the Implementation of Economic, Social and Cultural Rights in the African Charter on Human and Peoples' Rights* (hereafter the Principles and Guidelines) set out to confirm that such a right is implied in numerous provisions of the ACHPR. Specifically, the Principles and Guidelines identify that these provisions include, but are not limited to:<sup>610</sup>

...the right to life, dignity, work, food, health, economic, social and cultural development and to a satisfactory environment.

The Principles and Guidelines reiterate the meaning of the human right to water as postulated, specifically by General Comment 15.<sup>611</sup> It holds that "sufficient water" entails both an adequate and continuous water supply for everyone's personal and domestic use.<sup>612</sup> Such a supply is said to ordinarily include drinking, personal sanitation, washing

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<sup>607</sup> Para 6(a) of the Abuja Declaration.

<sup>608</sup> Para 6(a) of the Abuja Declaration.

<sup>609</sup> *The Principles and Guidelines on the Implementation of Economic, Social and Cultural Rights in the African Charter on Human and Peoples' Rights* (2011).

<sup>610</sup> Para 87 of the Guidelines and Principles.

<sup>611</sup> Para 88 of the Guidelines and Principles.

<sup>612</sup> Para 89 of the Guidelines and Principles.

of clothes, food preparation, and personal and household hygiene. A sufficient amount of water is necessary to prevent death from dehydration.<sup>613</sup>

The Principles and Guidelines furthermore outline the obligations that states should adhere to regarding the right to water. The first set of obligations, called "minimum core obligations", essentially entails ensuring access to the minimum crucial amount of water necessary for survival (although no specific amount is indicated in this regard); ensuring safe physical access to water facilities or services that provide safe, sufficient, and regular water; and refraining from using access to water as a political tool.<sup>614</sup> Next, the Principles and Guidelines outline very specific duties concerning states' obligations to adopt national strategies, plans, policies, and systems for the management, preservation, and sustainable use, amongst other issues, of water.<sup>615</sup> Important to this study is the duty placed on states to take certain steps to ensure that local authorities and other government entities who are not part of a state's central government, manage both water and sanitation services within their territories, and under their authority.<sup>616</sup> This is said to promote the facilitation of universal access to water and sanitation in sufficient quality, quantity, continuity, as well as at an equitable and affordable price.<sup>617</sup>

Of further relevance in this regard is the duty placed on states to increase the financing for local water and sanitation infrastructure.<sup>618</sup> This duty aims to promote the involvement of local government in addressing the needs of particularly poor persons, as well as those lacking access to water and sanitation.<sup>619</sup> It is expected of states to contribute to developing local government capacity to improve effective water supply and sanitation services.<sup>620</sup> States should also ensure that the private ownership of water and sanitation services, or any privatisation thereof, does not occur in the complete absence of any efficient and clear regulatory frameworks which ensure sustainable access to safe,

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<sup>613</sup> Para 89 of the Guidelines and Principles.

<sup>614</sup> Para 92(a) – (c) of the Guidelines and Principles.

<sup>615</sup> Para 92(d) – (o) of the Guidelines and Principles.

<sup>616</sup> Para 92(i) of the Guidelines and Principles.

<sup>617</sup> Para 92(i) of the Guidelines and Principles.

<sup>618</sup> Para 92(i) of the Guidelines and Principles.

<sup>619</sup> Para 92(i) of the Guidelines and Principles.

<sup>620</sup> Para 92(i) of the Guidelines and Principles.

sufficient, affordable, and physically accessible water and sanitation.<sup>621</sup> This is necessary to prevent private services providers from violating the right to access to water.<sup>622</sup>

Finally, the last set of obligations concerns vulnerable groups, equality, and the principle of non-discrimination.<sup>623</sup> These obligations include that all water and sanitation facilities and services are of sufficient quality, affordable, culturally appropriate, and meet the needs of members of both disadvantaged and vulnerable groups.<sup>624</sup> In this regard, the Principles and Guidelines indicate that relatively low-cost targeted water programmes should be developed in order to protect the aforementioned groups.<sup>625</sup> Additionally, states are required to ensure the adoption of appropriate water and sanitation pricing policies, whilst subsidising such services to low-income households.<sup>626</sup>

It is stated that informal human settlements should be upgraded through the provision of water services, and therefore no one should be denied access to water due to their housing or land status.<sup>627</sup> The aforementioned may be seen as particularly relevant to especially South African cities where there are extensive informal settlements. Lastly, the obligations furthermore postulate that provision should be made for the needs of women and children; that equitable access to water should be provided to marginalised farmers, and those relying on subsistence farming; as well as imprisoned persons' right to adequate water and sanitation should be adequately fulfilled.<sup>628</sup>

Following the above discussion concerning the law and policy surrounding the right to water from an African regional perspective, one may extrapolate certain details. For one, the right of access to water is indeed a fundamental value within the African human rights system, particularly since it is one of the rights that may be subjected to monitoring by judicial mechanisms. Moreover, it is exemplified in the various instruments discussed above that the human rights protected therein should be interpreted as being

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<sup>621</sup> Para 92(j) of the Guidelines and Principles.

<sup>622</sup> Para 92(j) of the Guidelines and Principles.

<sup>623</sup> Para 92(p) - (v) of the Guidelines and Principles.

<sup>624</sup> Para 92(p) of the Guidelines and Principles.

<sup>625</sup> Para 92(p) of the Guidelines and Principles.

<sup>626</sup> Para 92(q) of the Guidelines and Principles.

<sup>627</sup> Land status may refer to whether a person owns or rents the land in question; Para 92(r) of the Guidelines and Principles.

<sup>628</sup> Para 92(s) - (v) of the Guidelines and Principles.

interdependent, especially those in the ACHPR. It is also made clear that while the right to water is a derivative right in the African regional context, significant emphasis is placed on the rights of vulnerable groups such as women and children to have access to water.<sup>629</sup> The latter is in line with what was observed from the international perspective on the right to water.<sup>630</sup> From this, the study now moves to consider some judicial African regional perspectives relevant to the right to water with the aim of gaining clarity concerning the interpretation of the right in this context.

#### **2.4.2 African regional judicial interpretations**

Boussard *et al*/state that courts are pivotal in ensuring real impetus to the progression of social, economic, and cultural rights.<sup>631</sup> In a continent such as Africa that is burdened with poverty and inequality, courts are indispensable for ensuring accountability for violations, as well as remedial action, and safeguarding the interpretation of laws in a manner that is consistent with international human rights law and the overarching goals of equality and dignity.<sup>632</sup> With this in mind, some pertinent cases concerning the right to water in Africa will be elaborated on below in order to determine how the right to water has been interpreted by, mainly, the African Commission on Human and People's Rights. In doing so, more clarity may be obtained as to the content of the right in this regard, and what may be deemed necessary for the fulfilment thereof. This investigation is of particular importance to the right to water-discourse in the African regional context, because it is generally conceded that the right owes its roots to the quasi-judicial innovation of the African Commission on Human and People's Rights, who read the right to water from or into other rights that enjoy explicit recognition in regional legal instruments.<sup>633</sup>

Therefore, the investigation is further pertinent due to the right to water's derivative nature.<sup>634</sup> According to Cahill, the relationship between the human right to water and its

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<sup>629</sup> See paras 2.4.1.2 and 2.4.1.3 above.

<sup>630</sup> See paras 2.3.1.3 and 2.3.1.4 above.

<sup>631</sup> Boussard *et al* *The Human Rights to Water and Sanitation in Courts Worldwide: A selection of national, regional, and international case law* 3.

<sup>632</sup> Boussard *et al* *The Human Rights to Water and Sanitation in Courts Worldwide: A selection of national, regional, and international case law* 3.

<sup>633</sup> Bulto "The human right to water in the African human rights system" 70.

<sup>634</sup> See para 2.4.1 above and para 2.4.2.

derivative source (or the "parent right") is of such a nature that the former is a small subset of the latter.<sup>635</sup> The violation of the right to water only arises when the parent right is violated, and only in circumstances that involve persons' access to water.<sup>636</sup> The derivative human right to water in this instance can only be safeguarded to the extent of its overlap and utility with its derivative source. Thus, most of the claims in the cases below might be to such a source, but the court's deliberation may provide insight into the interpretation of the right to water.

#### *2.4.2.1 Free Legal Assistance Group v Zaire*<sup>637</sup>

In the *Free Legal Assistance Group v Zaire*<sup>638</sup> case, petitioners made various allegations concerning human rights violations. These allegations ranged from arbitrary arrests, torture, detention, and religious persecution. It included the lack of medicine and the government's ultimate failure to provide several basic services, particularly electricity and safe drinking water.<sup>639</sup> The Committee held that the state committed serious and massive violations of the rights upheld in the ACHPR, such as articles 4, 5, 6, 7, 8, 16, and 17.<sup>640</sup>

Of significant importance is the fact that the African Commission on Human and People's Rights determined that article 16 of the ACHPR, which postulates that every individual shall have the right to enjoy the best attainable state of physical and mental health, accordingly imbues the state with the duty to take the necessary measures to protect the health of their people.<sup>641</sup> The Commission emphasised that the failure of the government in this instance to provide basic services such as safe drinking water to their people amounts to a violation of article 16.<sup>642</sup> The Commission, for the first time, interpreted the right to water as a subset of the right to health. Thus, the seminal contribution made by this case to the African jurisprudence on the *interpretation* of the right to water is that

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<sup>635</sup> Cahill "Protecting rights in the face of scarcity: the right to water" 194.

<sup>636</sup> Bulto "The human right to water in the African human rights system" 73.

<sup>637</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9.

<sup>638</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9.

<sup>639</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9, 47.

<sup>640</sup> See the findings of *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9.

<sup>641</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9, 47.

<sup>642</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR 9, 47.

such a right is a subset of the right to health, and may be derived therefrom.<sup>643</sup> Moreover, the view that human rights are interdependent, and may greatly rely on the availability of water, is reinforced. The decision, in this case, is later reiterated in other cases such as in the case of *Sudan Human Rights Organisation and Centre on Housing Rights and Evictions v Sudan*<sup>644</sup> discussed below.<sup>645</sup>

#### 2.4.2.2 *Social and Economic Rights Action Centre v Nigeria*<sup>646</sup>

The often-cited communication to the African Commission on Human and People's Rights concerned the allegation that a consortium comprising of the state-owned Nigerian Petroleum Company and Shell Petroleum Development Company committed a range of human rights violations under the ACHPR.<sup>647</sup> It was held that the oil consortium exploited the oil reserve in Ogoniland without any regard for the environment or health of the local communities by disposing of toxic waste into the general environment and local waterways.<sup>648</sup> Moreover, the consortium neglected to maintain its facilities, which caused various avoidable spills in the village area.<sup>649</sup> The aforementioned activities resulted in severe contamination of water, soil, and air, as well as caused serious short and long-term health complications in the community.<sup>650</sup>

The Commission set out to first determine what is generally expected of governments under the ACHPR, and more specifically, the rights themselves, before considering the allegation of numerous rights being violated under the ACHPR.<sup>651</sup> Thus, the Commission commenced by indicating that at an international level, the accepted ideas pertaining to the various obligations produced by human rights indicate that all rights generate at least

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<sup>643</sup> This view will briefly be elaborated upon in the case of *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR in para 2.4.2.3 below.

<sup>644</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR.

<sup>645</sup> See para 2.4.2.3 below.

<sup>646</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96.

<sup>647</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 1 – 9.

<sup>648</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 2.

<sup>649</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 2.

<sup>650</sup> These health issues include skin infections, gastrointestinal and respiratory ailments, and increased risk of cancers, and neurological and reproductive problems; see *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 1, 2.

<sup>651</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 44.

four levels of duties for a state that agrees to adhere to a rights regime.<sup>652</sup> These obligations include the duty to respect, protect, promote, and fulfil these rights.

Following its interpretation of these obligations (each in turn), the Commission commenced by holding that at a primary level, the obligation to respect involves that the state should refrain from interfering with the enjoyment of all fundamental rights.<sup>653</sup> Hence, it should "respect right-holders, their freedoms, autonomy, resources, and liberty of their action."<sup>654</sup> Following this, the Commission provided an important interpretation of what the above obligation entails in terms of the fulfilment of certain socio-economic rights. The Commission said that the state is:<sup>655</sup>

...obliged to respect the free use of resources owned or at the disposal of the individual alone or in any form of association with others, including the household or the family, for the purpose of rights-related needs. And with regard to a collective group, the resources belonging to it should be respected, as it has to use the same resources to satisfy its needs.

Subsequently, at a secondary level, the committee held that the state is obliged to protect right-holders against other subjects via legislation, and the provision of effective remedies.<sup>656</sup> Such protection entails taking measures to protect the beneficiaries of rights from political, economic, and social interferences.<sup>657</sup> The Commission interpreted "protection" as involving the creation and maintenance of an atmosphere or framework by an effective interplay of regulations and laws, to enable individuals to freely realise both their rights and freedoms.<sup>658</sup>

The third obligation on states, namely to promote the enjoyment of all human rights, may be said to be very much intertwined with the obligation to protect.<sup>659</sup> To "promote" in this instance entails encouraging tolerance, raising awareness, as well as building infrastructures.<sup>660</sup> Lastly, the Commission interpreted the obligation on states to fulfil

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<sup>652</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 44.

<sup>653</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 45.

<sup>654</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 45.

<sup>655</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 45.

<sup>656</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 46.

<sup>657</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 46.

<sup>658</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 46.

<sup>659</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 46.

<sup>660</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 46.

everyone's rights and freedoms that it freely agreed to under the various human rights regimes.<sup>661</sup> This duty is seen as more of a positive expectation on the part of the state to move its machinery towards the actual realisation of the rights. "Fulfilment" of rights could comprise of either the direct provision of basic needs, such as food or resources, that can be used for food (hence, direct food aid or social security).<sup>662</sup>

The interpretation by the Commission in this instance of the duties on states concerning the fulfilment of rights, such as the right to water, is integral to this study. A judicial precedent was set towards what may reasonably be expected of states in the fulfilment of their obligations. Moreover, it provided judicial clarity and content to the obligations.

The Commission found that Nigeria violated various civil, economic, social, and political rights. The aforementioned includes the right not to be discriminated against, the rights to health, life, property, family protection, to dispose of one's wealth freely, and the right to a satisfactory environment.<sup>663</sup> Notably, the Commission determined that the contamination of drinking water sources by the state or non-state actors constitutes a breach of the right to health and the right to a satisfactory environment.<sup>664</sup> Therefore, as with the case discussed above, the Commission reinforced the position that the right to water is a subset of the right to health and to a satisfactory environment, and substantiates the view that the right to water may be derived from the aforementioned rights that are given explicit recognition in the ACHPR.

#### *2.4.2.3 Sudan Human Rights Organisation and Centre on Housing Rights and Evictions v Sudan*<sup>665</sup>

The *Sudan Human Rights Organisation and Centre on Housing Rights and Evictions v Sudan*<sup>666</sup> case regards the complaints filed on behalf of indigenous groups in the Darfur

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<sup>661</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 47.

<sup>662</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 47.

<sup>663</sup> *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96.

<sup>664</sup> Arts 16, 24 of the ACHPR; *Social and Economic Rights Action Centre v Nigeria* 2001 AHRLR 155/96 50 – 54.

<sup>665</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR.

<sup>666</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR.



region of Sudan who experienced immense and systemic violations of their human rights.<sup>667</sup> It was held that since 2003, after the emergence of armed conflicts in the Darfur region, militia known as the Janjaweed engaged in killing, raping, forcibly evicting, and poisoning the wells of thousands of indigenous peoples in the region.<sup>668</sup> The complainants argued that these acts should be considered a failure of the government of Sudan to both respect and protect the rights of the peoples of Darfur, and that it constitutes serious violations of various articles of the ACHPR.<sup>669</sup>

Of direct relevance to this study is the Commission's deliberation concerning the allegation of the violation of the indigenous peoples' right to health under article 16 of the ACHPR.<sup>670</sup> As per article 16, states must fulfil the right of every person to the best attainable state of physical and mental health and to take the necessary measures to protect the health of their people.<sup>671</sup> The Commission considered the allegation that the respondent state was complicit in poisoning wells and denying the community access to water sources in the Darfur region.<sup>672</sup>

The Commission gave regard to the substantial normative developments on the right to health internationally, and thus indicated that General Comment 14<sup>673</sup> on the right to health extends to access to potable water under its provisions. In terms of the state's duties in this regard, the obligation to protect was considered, and it was put forward that the state must ensure that third parties, such as non-state actors, do not infringe upon the enjoyment of the right to health.<sup>674</sup> The case considered the explicit mention by

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<sup>667</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 1 – 16.

<sup>668</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 1 – 16; 63 – 68.

<sup>669</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 1 – 16; 63 – 68.

<sup>670</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 206.

<sup>671</sup> Art 16 of the ACHPR.

<sup>672</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 207.

<sup>673</sup> CESCR General Comment No 14: The Right to the Highest Attainable Standard of Health UN Doc E/C12/2000/4 (2000).

<sup>674</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 209.

General Comment 14 that states should refrain from unlawfully polluting water during armed conflicts.<sup>675</sup>

The Commission held that violations of the right to health occurred through either the direct actions of states or other entities that were insufficiently regulated by the state.<sup>676</sup> The Commission relied on the seminal judgement made by in the *Free Legal Assistance v Zaire*<sup>677</sup> case, where the Commission stated that the failure of the state to provide safe drinking water to its people constitutes a breach of the right to health under article 16 of the ACHPR.<sup>678</sup> The relevant judgement in this instance holds that the various destructive acts by the respondent government, including the poisoning of water sources such as wells, exposed the victims to serious health risks, and therefore amounts to a violation of article 16 of the ACHPR.<sup>679</sup>

The above case contributed to the African jurisprudence on the right to water, since it reaffirmed and elaborated on the right being derived from certain recognised rights in the ACHPR. This case exemplified an African treaty being applied by an African enforcement mechanism to the atrocities in Darfur, whilst providing an important precedent pertaining to vulnerable people relying on the state's duties in the ACHPR to relieve their suffering, specifically regarding their lack of access to safe water. This case is instrumental to the African regional judicial discourse on the right to water in that it reiterates that even in conditions of armed conflicts, states cannot be lax in their duty to protect their communities' right to water.

However, in this case, the Commission received a clear request from the complainants to declare water an independent right under the Charter.<sup>680</sup> The Commission evaded this

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<sup>675</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 210; Art 34 of the CESCR General Comment No 14: The Right to the Highest Attainable Standard of Health UN Doc E/C12/2000/4 (2000).

<sup>676</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 210.

<sup>677</sup> *Free Legal Assistance Group v Zaire* 1995 100/93 ACHPR.

<sup>678</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 211.

<sup>679</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 212.

<sup>680</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR 126.

request without providing any reasoning. Given the serious human rights violations in this case, it is considered anomalous for the Commission to have bypassed a prayer from the victims without any apparent reason.<sup>681</sup>

As such, the Commission missed a potentially golden opportunity to clarify both the status and the legal basis of the human right to water in the African regional context. By assessing the three cases discussed in this section,<sup>682</sup> it is made clear that the African Commission on Human and People's Rights' consistent approach to the human right to water in the African context seems to be to treat the right as a derivative or auxiliary right that obtains protection via certain source or parent rights. Arguably, because the scope of the right to water rests on the particular right from which it is derived, both the legal basis for the right as well as the normative content thereof is obscured.<sup>683</sup> The next section of this chapter discusses theories and perspectives in the African regional scholarly discourse concerning the right to water. Specifically, the section below seeks to elaborate on how the right is interpreted in the given context, and the relevant duties and obligations deemed necessary to fulfil the right to water.

### ***2.4.3 African regional theories and scholarly perspectives***

Although rich in natural resources, Africa remains the world's poorest and most underdeveloped continent.<sup>684</sup> This may be inferred from a myriad of reasons, including the persistent lack of clean drinking water, the spread of deadly diseases such as HIV/AIDS and malaria,<sup>685</sup> corrupt governments<sup>686</sup> that have often committed atrocious human rights violations,<sup>687</sup> and failed central planning, amongst other issues.<sup>688</sup> According to a 2003 UNDP report, 25 of the lowest ranking countries in terms of development were

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<sup>681</sup> Bulto "The human right to water in the African human rights system" 71.

<sup>682</sup> See paras 2.4.2.1 – 2.4.2.3 above.

<sup>683</sup> Bulto "The human right to water in the African human rights system" 74.

<sup>684</sup> UNDP *Human Development Report 2003: Millennium development goals: A compact among nations to end human poverty*.

<sup>685</sup> Fischer 2003 *American Economic Review* 1 – 30.

<sup>686</sup> Fuchs and Horak 2008 *Telematics and Informatics* 99 – 116.

<sup>687</sup> Amnesty International *Monitoring and documenting human rights violations in Africa: A handbook for community activists*.

<sup>688</sup> Naik 2016 *International Journal of Water Resources Development* 2.

all African.<sup>689</sup> From more recent reports, it is discernible that the situation has not improved much.<sup>690</sup>

Naik<sup>691</sup> argues that the lack of access to clean drinking water detrimentally affects development in the continent. In fact, the author argues that any step towards the improvement of access to clean drinking water in Africa can resolve countless developmental barriers.<sup>692</sup> One may reason that water, the right thereto, and especially the implementation of the right, is extremely important to Africa as a whole.

Naik juxtaposes the myths against the realities concerning the water crises in Africa.<sup>693</sup> In this regard, one myth includes that Africa suffers from physical water scarcity.<sup>694</sup> However, in reality, 15% of the world population living in Africa share about 10% of its available water resources.<sup>695</sup> The reasoning of authors such as Addaney, Dube, and Getaneh<sup>696</sup> is aligned with that of Naik, wherein they state although the Democratic Republic of the Congo possesses an estimated 52% of the continent's water reserves, it is deemed as one of the countries with the lowest access to water rates in the world.<sup>697</sup> It is argued that poor access to water may be regarded as one of the major factors which reinforce certain negative dynamics that undermine sustainable development and promotes poverty, underdevelopment, and inequality in Africa.<sup>698</sup>

Regardless of the progress made internationally, the protection and realisation of the human right to water in various African countries remain a pipe dream. Although various factors may be to blame for this, authors suggest that the right to water as a derivative right, instead of a primarily explicit right, may have had an influence on its success in

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<sup>689</sup> UNDP *Human Development Report 2003: Millennium development goals: A compact among nations to end human poverty* 44.

<sup>690</sup> UNDP *Human Development Report 2019: Beyond income, beyond averages, beyond today: inequalities in human development in the 21<sup>st</sup> century* 35, 67.

<sup>691</sup> Naik 2016 *International Journal of Water Resources Development* 2.

<sup>692</sup> Naik 2016 *International Journal of Water Resources Development* 2.

<sup>693</sup> Naik 2016 *International Journal of Water Resources Development* 5.

<sup>694</sup> Naik 2016 *International Journal of Water Resources Development* 5.

<sup>695</sup> Naik 2016 *International Journal of Water Resources Development* 2

<sup>696</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 38 – 39.

<sup>697</sup> In fact, a mere 26% of the Democratic Republic of the Congo's populace has access to potable water; see Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 3; Montejano *In search of clean water: human rights and the mining industry in Katanga, DRC* 3.

<sup>698</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 39.

implementation.<sup>699</sup> This is because it has been argued that one is not able to assume the right to water unless rights to which it is constituent have been infringed.<sup>700</sup>

The implication is that the human right to water is not a standalone right, and consequently, it cannot be enforced unless its violation occurred under a parent right, such as the right to health.<sup>701</sup> Consequently, the right to water lacks an autonomous existence, and it is limited in scope. The scope of the right will depend on which right it is assumed to form a part of, and its legal basis and its normative content remain ambiguous.<sup>702</sup> Bulto posits that this bedevils the standardisation and progressive development of the right as an independent entitlement.<sup>703</sup>

Mégret<sup>704</sup> is of the view that the lack of explicit recognition of the right to water complicates the task for state parties' fundamental obligations (e.g., to promote, protect, fulfil and respect) to be applicable. It is no surprise that authors promote and emphasise the idea that it is essential for the legal foundations of the right to water to be both established and elucidated since demanding its fulfilment without legal foundations would be difficult.<sup>705</sup> Therefore, if the right to water is not recognised at national and local levels, right-holders may face an insurmountable task in exacting its enforcement, or in claiming remedies for its infringement.

As has been illustrated by the judicial decisions above,<sup>706</sup> it is possible for the so-called derivative right to water to be enforced. The African Commission has progressively interpreted the ACHPR in a way that recognises the right to water, although not providing it with autonomous recognition, or determining its normative elements.<sup>707</sup> Moyo<sup>708</sup> holds that several socio-economic rights that are not mentioned in the ACHPR are derivative.

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<sup>699</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 40.

<sup>700</sup> Cahill "Protecting Rights in the Face of Scarcity: The Right to Water" 194.

<sup>701</sup> Bulto "The human right to water in the African human rights system" 73.

<sup>702</sup> Bulto "The human right to water in the African human rights system" 73 – 74.

<sup>703</sup> Bulto "The human right to water in the African human rights system" 74.

<sup>704</sup> Mégret "Nature of Obligations" 130 – 132.

<sup>705</sup> O'Neill 2005 *International Affairs* 427, 430; Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 41.

<sup>706</sup> See paras 2.4.2.1 – 2.4.2.3 above.

<sup>707</sup> Bulto 2011 *African Human Rights Law Journal* 341 – 367.

<sup>708</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 51.

These rights include social security, adequate housing, and an adequate standard of living.

Commentators such as Petrova have promoted the argument that the right to water can be inferred from various provisions in the ACHPR, especially those concerning the right to a satisfactory environment, and the right to life since these guarantees cannot be fulfilled without access to water.<sup>709</sup> The above is substantiated in the Principles and Guidelines.<sup>710</sup> Hence, one may argue that relying on the right to water is not a "lost cause" in the African context.

Considering the above, it is arguable that although the efforts made in the African regional context has been commendable, not enough has been done to ensure a separate right to water. The decision by the African Commission in the *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan*<sup>711</sup> case above (which recognised that the poisoning of wells, amongst other issues, constitutes a breach of the right to health under the ACHPR) is both bold and revolutionary in its protection towards sufficient access, availability and quality of water. However, it undermined the strive for a substantive and independent right to water in Africa, by providing protection of access to safe water under the right to health, instead of promoting a distinct right to water.

A separate issue from the right to water's lack of explicit recognition is the duty on states to progressively, instead of immediately, realise everyone's right to water. Logically, due to the integral nature of water, one would assume that its associated right would merit immediate implementation.<sup>712</sup> Nevertheless, an overwhelmingly strong case was made that most developing countries do not have the capacity to ensure commitment to the immediate fulfilment of this duty.<sup>713</sup> As a compromise, states have to progressively fulfil the right to water, whilst immediately adhering to certain obligations, such as the guarantee that the right will be implemented without discrimination of any sort.<sup>714</sup> States

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<sup>709</sup> Petrova 2006 *Brooklyn Journal of International Law* 557.

<sup>710</sup> See para 2.4.1.5 above.

<sup>711</sup> *Sudan Human Rights Organisation and Centre on Housing and Evictions v Sudan* 279/03 and 296/05 2009 ACHPR.

<sup>712</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 41.

<sup>713</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 41.

<sup>714</sup> See art 17 of General Comment 15.

must see to the fulfilment of at least the minimum core of the right to water, which, according to Chapman and Russell,<sup>715</sup> prevents states from solely depending on the principle of progressive realisation concerning the maximum utilisation of available resources to render the rights meaningless.

As per General Comment 15, nine minimum essential obligations necessary for the fulfilment of the right to water are identified, including: to ensure access to the minimum essential amount of water, that is sufficient and safe for personal and domestic uses to prevent disease;<sup>716</sup> as well as to ensure physical access to water facilities or services that provide sufficient, safe and regular water;<sup>717</sup> and to adopt and implement a national water strategy and plan of action addressing the whole population.<sup>718</sup> Mbazira postulates that these nine core obligations, in particular, challenge the notion of economic, social, and cultural as being "programmatic and incapable of enforcement".<sup>719</sup> Otto and Wiseman put forward that developing countries should be tasked with demonstrating that they have made every effort in an attempt to succeed in meeting the minimum realisation of these rights.

The African Commission affirmed that the measures for the protection and enforcement of economic, social and cultural rights should include national constitutional, legislative and institutional, budgetary and policy measures, as well as both judicial and administrative measures as remedial recourse for the violation of these rights.<sup>720</sup> Although these measures are necessary and critical, these efforts may be hampered by lacklustre implementation and monitoring mechanisms.<sup>721</sup> The aforementioned issues could be seen as injurious stumbling blocks in, especially, the African context, where the right to water, separate from its recognition in the Principles and Guidelines, and in certain national

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<sup>715</sup> Chapman and Russell "Introduction" 6.

<sup>716</sup> Art 37(a) of General Comment 15.

<sup>717</sup> Art 37(c) of General Comment 15.

<sup>718</sup> Art 37(f) of General Comment 15.

<sup>719</sup> Mbazira *Litigating Socio-Economic Rights in South Africa: A choice between corrective and distributive justice* 2.

<sup>720</sup> Para 2 of the Principles and Guidelines.

<sup>721</sup> Addaney, Dube and Getaneh 2018 *Journal of Comparative Law in Africa* 64.

constitutions,<sup>722</sup> is still relatively defenceless. This is troublesome since, in the bulk of African countries, the right to water remains non-justiciable.<sup>723</sup>

Arguably, one main takeaway from the deliberation of the right to water from an African regional perspective is that the ultimate implementation and protection of the right may rely on its acceptance in the domestic law of states as a separate, stand-alone right. This would remove the potentially troublesome derivative element from the right, and allow for the development of its legal basis and normative content within the domestic setting. International instruments pertaining to the right to water indicate that the national government of a country in collaboration with local authorities or sub-national governments should work together towards the promotion and protection of the right for communities.<sup>724</sup> Given the current developmental issues in Africa, which may be significantly alleviated by access to adequate supplies of water, as well as the complexity surrounding the derivative nature of the right, one may deduce that a similar emphasis on the collaboration between national governments and sub-national governments is necessary in the African regional context.

In relation to the above, one may consider the subsidiarity principle especially relevant.<sup>725</sup> The principle of subsidiarity is known as a multifaceted concept that has found association with numerous schools of thought, and thus has various dimensions and conceptualisations.<sup>726</sup> In this study, the principle of subsidiarity is understood as urging a "rebuttable presumption for the local"<sup>727</sup> in multi-level governance systems. "Institutional subsidiarity", defined by Du Plessis as the identification and authorisation of an institutional actor that is deemed suitable to perform a particular function, is prudent since it may guide states as to the implementation of the right to water; in other words, contextually speaking, it may assist African states in determining exactly which level of governance *should* be responsible for the implementation of the right to water, or certain

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<sup>722</sup> Such as per art 27(1)(b) of the (South African) *Constitution*.

<sup>723</sup> Bulto 2011 *African Human Rights Law Journal* 341 – 367.

<sup>724</sup> See para 2.3 above.

<sup>725</sup> For an extensive discussion on the subsidiarity principle, see Du Plessis 2015 *CILSA* 281 – 315.

<sup>726</sup> Reinold 2019 *Third World Quarterly* 2094.

<sup>727</sup> Follesdal A 2016 *Law and Contemporary Problems* 148.



actions pertaining thereto.<sup>728</sup> The subsidiarity principle is further understood to be one of very few approaches that explains particular aspects of the co-existence and interrelationship between various actors within multi-actor systems of governance.<sup>729</sup> The principle provides vital guidance because it constrains a more superordinate or encompassing authorities to refrain from assuming matters that may be more appropriately dealt with, or disposed of, by subordinate, particular authorities or institutions.<sup>730</sup>

As De Visser<sup>731</sup> explains –

Subsidiarity is a general principle that says that governance should take place as close as possible to the citizens. It translates into the protection of lower levels of government against undue interference by national government. It also translates into a preference for placing functions and powers at lower levels of government where possible.

As such, the subsidiarity principle suggests that law-making and regulation should take place at the lowest possible level of governance, and thereby promotes local authorisation and efficiency over regulations and policies, whilst placing a check on centralised governance.<sup>732</sup> Stoa<sup>733</sup> opines that, in the right to water-dialogue, the principle of subsidiarity has grown in popularity because states have increasingly recognised the political and administrative benefits of decentralised water service delivery. The decentralisation of water service delivery is especially attractive to developing countries, such as those in Africa, that seek to relieve the burden on central governments and the associated budgets while empowering lower communities.<sup>734</sup>

Although this is merely one avenue that may aid to the fulfilment of the right,<sup>735</sup> this approach has been followed in South Africa.<sup>736</sup> The provision of water services is deemed

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<sup>728</sup> Du Plessis 2006 *Stell LR* 209; De Visser 2010 *Stell LR* 91.

<sup>729</sup> Du Plessis 2015 *CILSA* 294 – 295.

<sup>730</sup> Du Plessis 2006 *Stell LR* 209; De Visser 2010 *Stell LR* 91.

<sup>731</sup> De Visser 2008 <https://dullahomarinstitute.org.za/multilevel-govt/local-government-bulletin/volume-10-issue-1-february-march-2008/vol-10-no-1-subsidiarity-in-the-constitution.pdf>.

<sup>732</sup> Stoa 2014 *Utrecht Law Review* 31.

<sup>733</sup> Stoa 2014 *Utrecht Law Review* 32.

<sup>734</sup> Stoa 2014 *Utrecht Law Review* 32.

<sup>735</sup> The decision to transfer the responsibilities related to the implementation of the right to water in communities to local authorities should not be done with haste. Local authorities that may lack the necessary capacity to fulfil the latter responsibilities may result in the promise of access to water remaining largely unfulfilled. See Stoa 2014 *Utrecht Law Review* 32.

<sup>736</sup> See generally De Visser 2010 *Stell LR*; Langford, Stacey and Chirwa "Water" 34 – 37.

a function of local governments in South Africa,<sup>737</sup> and, additionally, the *Constitution* also provides generally that national or provincial government may assign matters that form part of its functions to municipalities.<sup>738</sup> In such cases, however, it must be evident that a matter may be most effectively dealt with locally, and the relevant local authority must possess the necessary capacity to administer the matter.<sup>739</sup> On this note, the next section of this chapter will focus on the South African perspective on the right to water, particularly how the constitutional right to water has been interpreted in the law, by the courts and scholars alike.<sup>740</sup>

## 2.5 South African perspectives

South Africa's status as a severely water-scarce country is reflected in the formulation of its legislative framework regarding water, of which the three main sources are the *Constitution*, the *WSA*, and the *NWA*. While emphasising the critical need for ensuring the practical realisation of water services provision to satisfy the constitutional water right, the legislation also highlights water scarcity, the necessity of effective management of national natural resources, the need to correct historical inequalities and promote justice and equality concerning the use and availability of water resources.<sup>741</sup> Generally, however, this section will focus on what is deemed necessary to fulfil the right to water, primarily from the point of view of local governments, since the provision of water services is deemed a function of local government by the *Constitution*. Specifically, this section will interrogate the main legislative sources of the right to water to determine how the right has developed in South Africa. The section also seeks to discuss prominent cases pertaining to the right to water in South Africa to establish how the right has been judicially interpreted in this context. Finally, the scholarly discourse on the constitutional water right will also be discussed with a view to determine what is expected of the government, particularly local governments, in their pursuit of fulfilling their function concerning water service delivery.

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<sup>737</sup> Schedule 4 Part B of the *Constitution*.

<sup>738</sup> S 156(4) of the *Constitution*.

<sup>739</sup> S 156(4)(a) – (b) of the *Constitution*.

<sup>740</sup> See para 2.5 below.

<sup>741</sup> Preamble to the *NWA* and *WSA*.

### **2.5.1 The legal architecture**

The equal and reasonable provision of adequate water services to everyone, in both an ecologically sustainable and economically efficient manner, has been prioritised in South African laws for at least the last two decades.<sup>742</sup> This is so, since water laws under the Apartheid rule endorsed deliberate segregation, stagnating the developmental capability of certain disadvantaged communities.<sup>743</sup> Woodhouse<sup>744</sup> states that the inequality of access to water marks the country's history even more deeply than inequality regarding access to land. As Viljoen rightly points out, the country's pre-1998 water law dispensation greatly added to the "sorry state of poverty by linking water access to land access."<sup>745</sup> Hence, the main purpose of the present water law in the country is to facilitate access to water by previously disadvantaged persons and communities.<sup>746</sup> South Africa's water law and policy is aimed at providing water to users to promote development, while focusing on the sustainability of the resource.<sup>747</sup>

To address the inequalities of the Apartheid regime adequately, water rights are more inclusive, as well as focused on both development (especially socio-economic development) and sustainability in the context of human dignity, justice, and the equitable distribution of resources.<sup>748</sup> Fortunately, the *Constitution* explicitly provides everyone with the right to access to sufficient water, whilst placing a positive obligation on the government to ensure the progressive realisation of access to water by

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<sup>742</sup> See Weaver *et al* 2017 *Water SA* 398.

<sup>743</sup> Tewari 2005 *Water International* 444. For more on the history of South Africa's water laws, see generally Tewari 2009 *Water SA*; and Woodhouse 2012 *Development and Change*.

<sup>744</sup> Woodhouse 2012 *Development and Change* 847.

<sup>745</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 1 – 33.

<sup>746</sup> Tewari 2005 *Water International* 444.

<sup>747</sup> Tewari 2005 *Water International* 444.

<sup>748</sup> Tewari 2005 *Water International* 444.

implementing reasonable legislative and other measures.<sup>749</sup> The right is in line with the international perspective on the right to water, specifically General Comment 15.<sup>750</sup>

This section seeks to briefly investigate the primary laws that provide recognition to the right to water in South Africa. As such, the content of the right to water may be elaborated on. Additionally, some light may be shed as to the actions required from the state (including local governments) to fulfil the constitutional water right.

### *2.5.1.1 The Constitution*

The right to water is essential to the fulfilment of various other basic rights.<sup>751</sup> Therefore, not only is the constitutional provision pertaining to water vital in its own right, but it has implications for the environment, health, food security, as well as overall economic development.<sup>752</sup> For instance, water may be indispensable to the fulfilment of section 24 of the *Constitution*, which provides everyone with the right to a healthy environment that is not harmful to their health or wellbeing. Given that water is necessary for human survival and must be protected from contamination and unhygienic environmental practices to preserve it for drinking purposes, one may derive the right to sanitation from the right to access to sufficient water, in addition to the abovementioned environmental right.

As protected by section 11 of the *Constitution*, the right to life is of further relevance in this regard.<sup>753</sup> The right to life may be translated as to impose both positive and negative

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<sup>749</sup> See para 1.4.1 above; s27(1)(b) and 27(2) of the *Constitution*; Belinskij and Kotzé 2016 *Aquatic Procedia* 31. The government is required to remove all legal, operational and administrative obstacles that may restrict access to water in this regard. Furthermore, it must provide for the basic water needs of individuals who are unable to access water themselves. See Fuo 2014 *Stellenbosch Law Review* 187 – 208; see generally Liebenberg *Socio-economic rights: adjudicating under a transformative constitution*; Belinskij and Kotzé 2016 *Aquatic Procedia* 30 – 38.

<sup>750</sup> See para 2.3.1.11 above.

<sup>751</sup> For a discussion as to the interrelationship of the right to water with other rights, see Kok and Langford "The right to water" 206 – 207.

<sup>752</sup> SAHR 2002 [https://www.sahrc.org.za/home/21/files/Reports/4th\\_esr\\_chap\\_9.pdf](https://www.sahrc.org.za/home/21/files/Reports/4th_esr_chap_9.pdf).

<sup>753</sup> Moreover, the right to dignity and equality are also of particular importance where the fulfilment of the right to water is concerned. Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* 37. The right to life is of particular relevance, since according to the *S v Makwanyane* case, any common acts or decisions of the government that could potentially add to the loss of life were deemed unconstitutional; see *S v Makwanyane* 1995 3 SA 391 (CC).

duties on the state. On the one hand, the state must ensure that no one's life is taken from them, whilst at the same time protecting the lives of its people.<sup>754</sup> Considering that human survival deeply depends on access to sufficient water of adequate quality, one may argue that water is particularly necessary for the fulfilment of the above dual duties concerning the right to life.<sup>755</sup>

As per section 28 of the *Constitution*, children have the right to basic nutrition, which arguably includes a sufficient amount of water necessary for drinking, food preparation and food production. Unlike sections 26 and 27 of the *Constitution*, this right is not qualified, hence the state has to see to the immediate realisation thereof.<sup>756</sup> Although in this instance, the right to water is derivative, it correlates to both the international and African regional protection of children's right to water, as provided for in the *CRC* and the *ACRWC* respectively.<sup>757</sup> Similar protection is given to detainees in section 35(2)(e) of the *Constitution*, which bears a correlation specifically to the international and African-regional judicial perspectives discussed above.<sup>758</sup> It is recognised that the provision of adequate and sufficient water to prisoners, for example, amounts to conditions of detention that are consistent with human dignity.<sup>759</sup>

Local governments are required to aid to the realisation of this right by ensuring adequate water provision services to its community. For instance, section 152(1) of the *Constitution* determines the objects of local government. Of particular relevance in this regard is section 152(1)(b), which holds that an object of local government is to ensure the provision of services to communities in a sustainable manner. Section 152(1)(d) further provides for the promotion of a safe and healthy environment.<sup>760</sup> Finally, it is explicitly

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<sup>754</sup> Currie and De Waal *The Bill of Rights Handbook* 285.

<sup>755</sup> In *S v Makwanyane* 1995 3 SA 391 (CC) confirmed the significance of the right to life, in addition to rendering any decisions or practices of government that contribute to loss of life unconstitutional; see Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* 37.

<sup>756</sup> Kok and Langford "The right to water" 206 – 207.

<sup>757</sup> See paras 2.3.1.4 and 2.4.1.2 above.

<sup>758</sup> See paras 2.3.2 and 2.4.2 above.

<sup>759</sup> See paras 2.3.2 and 2.4.2 above; s 35(2)(e) of the *Constitution*; and Kok and Langford "The right to water" 206 – 207.

<sup>760</sup> S 152(2) of the *Constitution* further provides that a municipality must strive, within its financial and administrative capacity, to achieve the objects set out in s 152(1) of the *Constitution*. See also Bekink *Principles of South African Local Government Law* 67-70.

recognised that, according to Schedule 4 Part B of the *Constitution*, water services provision is a function of local government. The local sphere of government consists of municipalities,<sup>761</sup> which must structure and manage their administration, budgeting and planning processes to prioritise the basic needs of their communities, to promote the social and economic development thereof,<sup>762</sup> as well as participate in national and provincial development plans.<sup>763</sup>

Notably, the *Constitution* provides that a municipality has executive authority over, and the right to administer, all local government matters assigned to it by Schedule 4 Part B and Schedule 5 of the *Constitution*, as well as any other matter that national or provincial legislation may assign to it.<sup>764</sup> Municipalities are also required to create and administer bylaws aimed at the effective administration of the matters assigned to it. Nevertheless, according to section 7(2) of the *Constitution*, the *state* is required to respect, protect, promote, and fulfil all rights in the Bill of Rights. Therefore, the aforementioned implies that whilst the state must ensure the progressive realisation of the water right, they must observe the above duties as well. Consequently, all spheres of government must see to the fulfilment of section 27(1)(b), 27(2) of the *Constitution*.

Upon interpreting the duties in section 7(2) of the *Constitution*, it is made clear that the duty to *respect* entails that the state may not arbitrarily remove the right of access to water.<sup>765</sup> A negative duty is therefore implied.<sup>766</sup> Accordingly, municipalities may not unjustly interfere with its community's access to water.<sup>767</sup> Where the deprivation or limitation of the right is inevitable, a municipality is required to take steps to mitigate any interference of a water supply.<sup>768</sup>

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<sup>761</sup> S 151(1) of the *Constitution*.

<sup>762</sup> S 153(a) of the *Constitution*.

<sup>763</sup> S 153(b) of the *Constitution*.

<sup>764</sup> S 156(1)(a) – (b) of the *Constitution*.

<sup>765</sup> Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* 34.

<sup>766</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 98.

<sup>767</sup> Brand "Introduction to socio-economic rights in the South African Constitution" 10.

<sup>768</sup> Brand "Introduction to socio-economic rights in the South African Constitution" 10; as per the *Residents of Bon Vista Mansions v Southern Metropolitan Local Council* 2002 6 BCLR 625 (W) 20, the residents' right to water was hampered due to the municipality disconnecting the supply. The court

On the other hand, the duty on the state to protect (the right to water), as per section 7(2) of the *Constitution*, may be interpreted to include that the state should develop legislation and policies which prevents persons or organisations from violating others' right of access to sufficient water.<sup>769</sup> Municipalities may comply with this duty by, for example, developing and adopting bylaws.<sup>770</sup> In doing so, municipalities must protect their communities from having their right to water violated.<sup>771</sup>

The duty to promote may signify that the state is compelled to increase awareness and respect for the constitutional water right.<sup>772</sup> The duty on the state to *fulfil*, may entail that the state should take positive steps in order to assist persons who lack access to water. Although the state, and thus every municipality, is not burdened with an absolute duty to provide immediate and unlimited access to water to every person in South Africa, it should endeavour to progressively realise this right to the majority of persons.<sup>773</sup> The former should occur within the state's available resources,<sup>774</sup> to not only improve the standard of water supply to households beyond basic provision, but to also ensure that such provision is sustainable.

The *Constitution* goes beyond merely providing for the right to water.<sup>775</sup> Instead, it places explicit duties on the government to fulfil the constitutional water right.<sup>776</sup> While the state is required to do so progressively, and within their available resources,<sup>777</sup> local governments, specifically, are required to give effect to the right to water by the provision

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determined that such a limitation of the right to water has to be justified in order for it to be constitutional.

<sup>769</sup> Brand "Introduction to socio-economic rights in the South African Constitution" 10.

<sup>770</sup> Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* 34; Brand "Introduction to socio-economic rights in the South African Constitution" 10.

<sup>771</sup> Brand "Introduction to socio-economic rights in the South African Constitution" 10.

<sup>772</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 98; Hofmeyr *Intergovernmental Response Measures to Address Failing Municipal Water Supply Services: a Legal Perspective* 35.

<sup>773</sup> S 27(2) of the *Constitution*.

<sup>774</sup> S 27(2) of the *Constitution*.

<sup>775</sup> See Singh's motivation for the implementation of the right to water, where the author holds that "all efforts made to enable people to enjoy the human right to water can be classified as efforts at 'implementation' of the right." Singh *The Human Right To Water* 9.

<sup>776</sup> See s 27(2) and Schedule 4B of the *Constitution*.

<sup>777</sup> S 27(1)(b), (2) of the *Constitution*.

of potable water supply services.<sup>778</sup> Therefore, the right to water in South Africa goes beyond merely remaining a *human right*, but finds itself with opportunity for practical implementation through concrete legal measures.<sup>779</sup> These legal measures are, furthermore, found in the *WSA*, which will be elaborated on below.

### *2.5.1.2 The Water Services Act 108 of 1997*

The *WSA* is the legal instrument that regulates the accessibility of water by domestic consumers. It secures the right of access to a basic water supply that is necessary to safeguard sufficient water and an environment that is not harmful to one's health or wellbeing, thereby codifying section 27(1)(b) of the *Constitution*.<sup>780</sup> The *WSA* defines the right to a basic water supply as the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households, including informal households, to support life and personal hygiene.<sup>781</sup> Importantly, the preamble to the *WSA* explicitly states that the duty to provide water supply services in an efficient, equitable, and sustainable manner falls on all spheres of government. This duty includes that such water services must be sufficient for both subsistence and sustainable economic activity.<sup>782</sup>

The contours of the concept of a basic water supply may be found in later regulations issued by the then Department of Water Affairs and Forestry, specifically in the 2001 *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*.<sup>783</sup> These regulations put forward that the minimum standard for basic water supply services includes a minimum quantity of potable water of 25 litres per person per day, or

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<sup>778</sup> Schedule 4B of the *Constitution*.

<sup>779</sup> See Tiboris' views on this, where he holds that the recognition of the right to water on state level does not do much more than merely act as a potentially effective mechanism for improving access to water; Tiboris 2019 *Human Rights Quarterly* 931.

<sup>780</sup> See the Preamble and s3(1) of the *WSA*.

<sup>781</sup> S 1(iii) of the *WSA*.

<sup>782</sup> Preamble to the *WSA*.

<sup>783</sup> *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001. Shortly after the release of these regulations, the 2003 *Strategic Framework for Water Services* was released, which regards the provision of at least a basic water supply in South Africa (called a "universal service obligation") an integral policy priority, and requires from government to make sufficient funds available to make this possible. In addition to reiterating the meaning of what a basic water supply facility/service entails, it also set several targets, amongst which is the achievement of free basic water supply to all South Africans by 2008. See the SFWS 2003 6, 46.



six kilolitres per household per month, that is available within 200 metres of a household, and with an effectiveness that ensures no consumer is left without supply for more than seven full days in a year.<sup>784</sup>

### *2.5.1.3 The National Water Act 36 of 1998*

Water resource management is essential for safeguarding the availability of water for the provision of water services. The *NWA* is the principal legal instrument relating to the regulation of water resources in South Africa.<sup>785</sup> Thus, it may be said that it transformed the country's water legal framework by putting forth a comprehensive agenda for water resource management.<sup>786</sup> In essence, the *NWA* is premised on several guiding principles which aim to remedy the inequities of the past regarding water distribution, while furthering the realisation of the constitutional water right.<sup>787</sup>

An important component of the *NWA* is the inclusion of the public trust doctrine.<sup>788</sup> Section 3 of the *NWA* explicitly states that the National Government, acting through the Minister, is regarded as the public trustee of the nation's water resources, and therefore has the power to regulate use, flow, and control of *all water* within the country.<sup>789</sup> Accordingly, at the core of this doctrine lies the fiduciary duty of the state to hold state sovereign resources for the benefit of the general public.<sup>790</sup>

Thus, while the state acts as the trustee of South Africa's water, the nation remains the beneficiary thereof.<sup>791</sup> It is postulated that the public trust doctrine might have entered

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<sup>784</sup> See para 6.5.3 of the *White Paper on a National Water Policy for South Africa* (1997); para 3 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>785</sup> See Viljoen *The Public Trust Doctrine in South African Water Law* 29 – 30.

<sup>786</sup> In contrast, the *NWA* also adopts and facilitates the application of certain economic approaches to water management. See Gowlland-Gualtieri *South Africa's Law and Policy Framework: Implications for the right to water* 3, 8 – 10.

<sup>787</sup> See the Preamble of the *NWA*, which holds that it recognises "that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources."

<sup>788</sup> See s 3 of the *NWA*. See also s 24(o) of the *National Environmental Management Act* 107 of 1998; Glazewski *Environmental Law in South Africa* 17; Pienaar and Van der Schyff *LEAD* 184. See also Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 279 for more on the history of the public trust doctrine in South African law.

<sup>789</sup> See s 3(1) – (3) of the *NWA*.

<sup>790</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 44.

<sup>791</sup> Pienaar and Van der Schyff 2007 *LEAD* 184.

the South African legal regime without much ado, but it completely altered the foundation of the country's water law dispensation.<sup>792</sup> With the introduction of the public trust doctrine, the *NWA* caused the abolishment of the previous private rights system, and instead implemented a public rights system directed at the beneficiaries of the trust.<sup>793</sup>

Therefore, the introduction of the public trust doctrine by the *NWA* contributes to the interpretation of the right to water in the South African context, in that it is primarily aimed at awarding the right of the use and enjoyment of water as a natural resource to the people as a collective entity.<sup>794</sup> The state has the duty to regulate use and access of the country's water resources in the public's interest.<sup>795</sup> Thus, the doctrine does not provide everyone with unlimited access and use of water resources, but section 4(1) of the *NWA* holds that water may be used without a licence for reasonable domestic use, e.g., domestic gardening, firefighting and recreational usage.

### ***2.5.2 South African judicial interpretations***

In South Africa, courts are instrumental in ensuring the effective protection and translation of the range of constitutionally entrenched socio-economic rights into material entitlements.<sup>796</sup> Accordingly, various cases have, over the years, augmented the understanding of the right to access to sufficient water. Some of these cases will be discussed below in view of determining how the South African courts have interpreted the right.

#### *2.5.2.1 Residents of Bon Vista Mansions v Southern Metropolitan Local Council*<sup>797</sup>

In *Residents of Bon Vista Mansions v Southern Metropolitan Local Council* (hereafter the *Bon Vista* case), a municipality in Johannesburg disconnected the water supply to a block of flats, which resulted in the applicant launching an urgent application to seek interim

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<sup>792</sup> Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 340.

<sup>793</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 44; Stein 2005 *Texas Law Review* 2167; Gowlland-Gualtieri *South Africa's Law and Policy Framework: Implications for the right to water* 4.

<sup>794</sup> Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 352.

<sup>795</sup> Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 352.

<sup>796</sup> Mubangizi *The Protection of Human Rights in South Africa* 138 – 139.

<sup>797</sup> *Residents of Bon Vista v Southern Metropolitan Local Council* 2002 6 BCLR 625 (W).

relief in the form of the municipality restoring the water supply.<sup>798</sup> As per section 4(3) of the *WSA*, the court noted that a water supply may not be discontinued, should it result in a person being subjected to the denial of access to basic water services due to non-payment. The former is especially so if the individual subjected to the disconnection has proved, to the satisfaction of the water services authority in question, that they are unable to pay for basic water services.<sup>799</sup>

The court paid attention to section 4 of the *WSA*, which enjoins a water service provider to set conditions during the circumstances in which water services may be discontinued, along with the procedures relevant to the discontinuation of such services. The court also considered the constitutional water right, and the obligation on the state to respect, protect, promote and fulfil the rights enshrined in the Bill of Rights.<sup>800</sup> Consequently, the court found that if a municipality disconnects an existing water supply to its users, it amounts to a *prima facie* breach of its constitutional duty to respect the existing right of access to water, and thereby requires constitutional justification concerning the general limitations clause entrenched in the *Constitution*.<sup>801</sup>

In this case, there was an existing access to water before the supply was disconnected by the municipality.<sup>802</sup> The court determined that disconnecting the water supply breached the city's constitutional duty to respect the right of access to sufficient water, by depriving the residents of their existing access. Therefore, the onus rested on the municipality to justify the above breach, since the residents of Bon Vista showed a *prima facie* right to a continuous water supply, which was directly being infringed.<sup>803</sup>

Although the municipality in this instance was justified in disconnecting the water supply to the residents, it did not comply with the set minimum statutory requirements of notice and providing the water consumers with an opportunity to make representations. The residents were unable to make representations to prove to the water service provider

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<sup>798</sup> *Bon Vista* case 10. See Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 261 – 262; Du Plessis 2010 *RECIEL* 320.

<sup>799</sup> *Bon Vista* case 26.

<sup>800</sup> See s 27(1)(b) and s 7(2) of the *Constitution* respectively.

<sup>801</sup> The limitations clause is present in s 36 of the *Constitution*; see the *Bon Vista* case 16 – 20; 27.

<sup>802</sup> Du Plessis 2010 *RECIEL* 320.

<sup>803</sup> *Bon Vista* case 20.

that they cannot afford or pay for their water supply. The service provider was obliged to refrain from terminating the supply, as per section 4 of the *WSA*. The court granted an interim order whereby the city was required to restore the water provision to the residents of Bon Vista.<sup>804</sup>

The human right to water imposes an obligation on states to provide water and water facilities to persons who cannot afford it through their own means.<sup>805</sup> The state has a core duty to ensure access to the basic essential amount of water both personal and domestic use.<sup>806</sup> Accordingly, the approach that was adopted in this case remains consistent with international law, in that a state is prohibited from unjustifiably disconnecting or excluding water supply from services.<sup>807</sup>

The facts of the *Bon Vista* case provide significant insight into the nature and parameters of the meaning that the courts, up to that point, ascribed to the constitutional right of access to sufficient water. Although the case primarily focused on the *access* aspect of the right to water, it made two important contributions to the right-to-water-discourse. Firstly, the court confirmed that the right to respect implies that people may not be denied access to water provision without being allowed an actual opportunity to make representations (as to their circumstances). Secondly, the obligation further entails that a person may not be denied the provision of basic water services, where that person can satisfactorily prove to the relevant water service authority their inability to pay for such services.<sup>808</sup>

#### *2.5.2.2 Mazibuko v City of Johannesburg*

As briefly mentioned above, the *Mazibuko* case meaningfully contributed to the interpretation of the obligations imposed on the state by the constitutional water right.<sup>809</sup> In the *Mazibuko* case, the court had to determine the extent of the positive duty on the

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<sup>804</sup> See Du Plessis 2010 *RECIEL* 320 for a discussion on the *Bon Vista* case.

<sup>805</sup> Art 15 of General Comment 15.

<sup>806</sup> Art 37(a) of General Comment 15.

<sup>807</sup> Art 44(a) of General Comment 15.

<sup>808</sup> Moyo *Water as a human right under international human rights law: Implications for the privatisation of water services* 261 – 262; Du Plessis 2010 *RECIEL* 320.

<sup>809</sup> See para 1.4 above.

state to realise the right to access to sufficient water.<sup>810</sup> The court focused on the qualifying provision in section 27(2),<sup>811</sup> which places a duty on the state to take reasonable legislative and other measures to progressively realise the right to access to sufficient water within its available resources.<sup>812</sup> As per the court's interpretation of the aforementioned provision, it was made clear that the *Constitution* does not require the state to provide water on demand to every person.<sup>813</sup> Hence, the court, in this case, followed a similar interpretation of the state's obligation to realise socio-economic rights such as in the cases of *Minister of Health v Treatment Action Campaign*<sup>814</sup> and *Government of the Republic of South Africa v Grootboom*.<sup>815</sup>

In the *Mazibuko* case, the court finally ruled that it was inappropriate for it to provide a quantified content to what constitutes sufficient water because it is the prerogative of the government to do so.<sup>816</sup> Moreover, the court rejected the applicants' argument that six kilolitres of water was insufficient for larger households, and held that the City of Johannesburg's Free Basic Water Policy falls within the scope of reasonableness, and does not infringe section 27 of the *Constitution* nor the *WSA*. From the facts of the *Mazibuko* case, it is evident that water services authorities must comply with certain minimum standards regarding the provision of water to South Africans.

However, this serves as the baseline only, since it is expected of the state to realise socio-economic rights progressively, and in doing so, seek to achieve higher standards in relation thereto. The *Mazibuko* case exemplified the situation that even when water-related legislation and policies are fully implemented, the quantity of the water provided may still be insufficient to satisfy the basic needs of some impoverished households.<sup>817</sup> Consequently, it may be expected of municipalities to take the initiative and go beyond

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<sup>810</sup> S 27(1)(b) of the *Constitution*.

<sup>811</sup> S 27(2) of the *Constitution*.

<sup>812</sup> *Mazibuko* case para 48-49.

<sup>813</sup> *Mazibuko* case para 50.

<sup>814</sup> *Minister of Health v Treatment Action Campaign* 2002 5 SA 721 (CC).

<sup>815</sup> *Government of the Republic of South Africa v Grootboom* 2001 1 SA 46 (CC).

<sup>816</sup> *Mazibuko* case para 60.

<sup>817</sup> See paras 1.4 above and 2.5.3 below.

the minimum standard, to reinforce the social-justice potential of the constitutional water right.<sup>818</sup>

### 2.5.2.3 *Nokotyana v Ekurhuleni Metropolitan Municipality*<sup>819</sup>

The judicial system has been relied upon on several other occasions to decide on issues about basic service delivery and the right to water.<sup>820</sup> For instance, in the case of *Nokotyana v Ekurhuleni Metropolitan Municipality*,<sup>821</sup> the Constitutional Court was approached by the applicants after achieving partial success in the High Court. In this instance, the relevant municipality accepted its obligation to provide water taps and refuse removal services to the residents of the informal settlement, pending the approval of their application to be upgraded to a formal settlement.<sup>822</sup> However, their request to the Constitutional Court seeking the provision of temporary basic sanitation services and high-mast lighting while they await confirmation of the status of their settlement failed.<sup>823</sup> The court ordered the members of the Executive Council for Local Government and Housing, Gauteng, to take a final decision on the Ekurhuleni Metropolitan Municipality's application in terms of Chapter 13 of the *National Housing Code*, published in terms of section 4 of the *Housing Act*,<sup>824</sup> to upgrade the status of the Harry Gwala Informal Settlement within 14 months of the date of the Court's order.<sup>825</sup>

From the above, one may hold that the judiciary is crucial to the progress of the constitutional water right, especially insofar as consistent, and innovative judicial interpretation. In some instances, this would require courts to assume a more assertive position than in ordinary traditional contexts, particularly if they are to contribute to the nation's transformative constitutionalism aspirations. Kibet and Fombad argue that courts

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<sup>818</sup> Fuo *Local Government's role in the pursuit of the transformative constitutional mandate of social justice in South Africa* 155.

<sup>819</sup> *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC).

<sup>820</sup> See for instance *City of Cape Town v Strümpher* 2012 4 SA 207 (SCA); *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC).; *Minister of Water Affairs and Forestry v Stilfontein Gold Mining Company Limited* 2006 (ZAGPHC) 47 (15 May 2006); *Manqele v Durban Transitional Metropolitan Council* 2002 6 SA 423 (D).

<sup>821</sup> *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC).

<sup>822</sup> *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC) 3.

<sup>823</sup> *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC) 3.

<sup>824</sup> 107 of 1997.

<sup>825</sup> *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC) 27 – 30.

are, therefore, required to liberate themselves from previously self-imposed restraints,<sup>826</sup> which may undermine their position in the equilibrium of governmental power.<sup>827</sup> A failure by the judiciary to appreciate the breadth of their role and that of the law could seriously undermine the transformative aspirations of the *Constitution*,<sup>828</sup> and may specifically hinder the realisation of our constitutional water right.

### **2.5.3 South African theories and scholarly perspectives**

The constitutional water right is a significant accomplishment for the country, since, as Gabru<sup>829</sup> states, access to South Africa's limited water resources has historically been dominated by persons with access to both land and economic power. Resultantly, the majority of South Africans have struggled to secure the right to water.<sup>830</sup> Although Apartheid-era legislation might not have discriminated directly on the grounds of race, the racial imbalance concerning land ownership inevitably resulted in the disproportionate denial of water to, especially, black persons.<sup>831</sup> Even more, both the rural and urban poor populace were traditionally significantly vulnerable in terms of securing access to the right to water.<sup>832</sup> Regardless of the political dispensation, poverty and economic inequality tend to manifest in certain patterns that harshly prejudice vulnerable groups and persons based on factors such as their gender, geographic location, race and disability status, resulting in their inability to access certain necessities such as water.<sup>833</sup>

According to Pienaar and Van der Schyff,<sup>834</sup> to accommodate the socio-economic demands of the right to water, a massive change in South Africa's water law dispensation was necessary. Therefore, firstly, the distinction between public and private water ownership was abolished and replaced by water allowances within the discretion of the then Minister

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<sup>826</sup> Such as its avoidance to elaborate on the normative content of rights, legal culture, and specifically how judges appreciate the spirit of the *Constitution* and its purposes; see Kibet and Fombad 2017 *AHRLJ* 357; and generally, Klare 1998 *SAJHR*.

<sup>827</sup> Kibet and Fombad 2017 *AHRLJ* 357.

<sup>828</sup> Kibet and Fombad 2017 *AHRLJ* 357.

<sup>829</sup> Gabru 2005 *PELJ* 2.

<sup>830</sup> See, for instance, Dugard *The right to water in South Africa* 12 – 16; Magaziner 2008 *North Carolina Journal of International Law and Commercial Regulation* 509 – 580;

<sup>831</sup> Gabru 2005 *PELJ* 2.

<sup>832</sup> Gabru 2005 *PELJ* 2.

<sup>833</sup> SAHRC *Equality Report 2017/2018: Achieving substantive economic equality through rights-based radical socio-economic transformation in South Africa* 4.

<sup>834</sup> Pienaar and Van der Schyff 2007 *Law, Environment and Development* 181.

of Water Affairs and Forestry, as the trustee of all water resources on behalf of the nation. Water now belongs to all of the country's people, and the Anglo-American public trust doctrine (founded in Roman law)<sup>835</sup> was thereby introduced by the *NWA*.<sup>836</sup> The legislature overcame the difficulty in vesting ownership of water, as a natural resource, in "all people" by emphasising the state's fiduciary role and duty throughout the *NWA*.<sup>837</sup> While the introduction of the public trust doctrine amounted to a significant change in the country's water law, Thompson argues that it is not a new addition at all. This is so since South African legal system descends from Roman law. Van der Schyff states that the idea of public trusteeship first emerged in the *White Paper on a National Water Policy for South Africa 1997*.<sup>838</sup>

The public trust doctrine is uniquely relevant to this study insofar it relates to both water services delivery and cities. One may argue that the public trust doctrine is particularly integral for the preservation of water services provision, considering that seeing to the water needs of the South African people lies at the heart of thereof. Although the public trust doctrine speaks to the national sphere of government,<sup>839</sup> it is arguably also linked to the local sphere of government.<sup>840</sup> This is because several provisions in law link it indirectly to all organs of state, including the local sphere of government. The latter includes chapter 3 of the *Constitution* which emphasises that all spheres of government must adhere to the principles of co-operative governance. Section 7(2) of the *Constitution*, which requires the state to respect, protect, promote and fulfil the rights in the Bill of Rights (including section 27(1)(b) which ensures the right to sufficient water) also indicates that, although the public trust doctrine leans toward the national sphere of government, it applies to the workings of government as a whole.

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<sup>835</sup> See Van der Schyff *The concept of public trusteeship as embedded in the South African National Water Act, 1998* 4; Viljoen *The Public Trust Doctrine in South African Water Law* 35.

<sup>836</sup> See para 2.5.1.3 above; Pienaar and Van der Schyff 2007 *Law, Environment and Development* 183.

<sup>837</sup> See para 2.5.1.3 above; s3 of the *NWA*; Pienaar and Van der Schyff 2007 *Law, Environment and Development* 184.

<sup>838</sup> Van der Schyff *The Constitutionality of the Mineral and Petroleum Resources Development Act 28 of 2002* 106; Van der Schyff 2010 *PELJ* 122; Viljoen *The Public Trust Doctrine in South African Water Law* 35.

<sup>839</sup> See para 2.5.1.3 above.

<sup>840</sup> See Freedman's argument in this regard on the public trust doctrine as a principle of interpretation; Freedman "Conservation, sustainable use of natural resources and the notion of public trusteeship" 289 – 290.



The question now arises: what exactly does this doctrine entail for the right to water? Viljoen posits that state sovereign ownership means that water resources are held by the state in a fiduciary capacity, which necessitates that it is used in public interest.<sup>841</sup> While the title in public trust property is vested in the state, the nation is the beneficiary.<sup>842</sup> Accordingly, the doctrine recognises the notion of "public rights to use water to the nation as beneficiary".<sup>843</sup> While this is so, Viljoen goes on to say that that the introduction of the public trust doctrine in the country's water resources also entails a system of public rights on water as a natural resource.<sup>844</sup> These public rights are both determined and restricted by the *NWA*.<sup>845</sup>

The constitutionally entrenched right to water in South Africa has been the subject of considerable scholarly discussion.<sup>846</sup> Du Plessis<sup>847</sup> holds that, once one considers the broader relationship that exists between people and water, it is elucidated that both a rich and layered constitutional ground underpins the right of access to sufficient water. Thompson<sup>848</sup> proffers the idea that the right to have access to sufficient water is a socio-economic, positive right, which imposes positive duties on the state.

In turn, Du Plessis postulates that, although the constitutional water right is enforceable, it is framed as an *access* right.<sup>849</sup> The right of access to water does not safeguard an "all-encompassing right to water".<sup>850</sup> No so-called blanket obligation is placed on the South

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<sup>841</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 38.

<sup>842</sup> Pienaar and Van der Schyff *LEAD* 184; Viljoen *The Public Trust Doctrine in South African Water Law* 39.

<sup>843</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 39.

<sup>844</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 48.

<sup>845</sup> Viljoen *The Public Trust Doctrine in South African Water Law* 49; Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 345.

<sup>846</sup> See, for instance, Dugard *The right to water in South Africa* 2 – 27; Soyapi 2017 *PELJ* 2 – 18; Du Plessis 2010 *RECIEL* 316 – 327; Kidd 2004 *SAJHR* 119 – 137; De Visser, Cottle, and Mettler 2003 *LDD* 27 – 48; Kok and Langford "The right to water" 191 – 212; Magaziner 2008 *North Carolina Journal of International Law and Commercial Regulation* 509 – 580; Cooper 2017 *Journal of African Law* 57 – 81; Belinskij and Kotzé 2016 *Aquatic Procedia* 30 – 38; Du Plessis 2017 *SAJHR* 279 – 307; Fuo 2013 *Murdoch University Law Review* 21 – 37; Fuo 2015 *LDD* 1 – 28; Gabru 2005 *PELJ* 1 – 34; see generally Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services*; and Swart and Adams "Water services provision and the protection of water resources" 445 – 480.

<sup>847</sup> Du Plessis 2010 *RECIEL* 316.

<sup>848</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 145.

<sup>849</sup> Du Plessis 2010 *RECIEL* 316 – 317.

<sup>850</sup> Du Plessis 2010 *RECIEL* 317.

African government to fulfil the right immediately.<sup>851</sup> This is so, since, the drafters of the *Constitution* in all likelihood paid mind to the potential limit on state resources, and remained realistic in merely ascribing the progressive realisation of the right to the state. The above intricacies of water as a socio-economic and access right is well illustrated in the *Mazibuko* case.<sup>852</sup>

Consequently, and as may be expected, there has been widespread critique and comment on the *Mazibuko* judgement.<sup>853</sup> Ngang<sup>854</sup> argues that the court's application of the jurisprudence regarding accountability caused a setback to the enforcement of the right to water,<sup>855</sup> since accountability is a central principle in the protection of human rights.<sup>856</sup> However, Kotzé agreed with the court's conservative approach, and argues that following this sustainability-oriented approach, when it concerns certain socio-economic rights, could allow for the protection of natural resources through implementing constraints on the use thereof.<sup>857</sup> On the other hand, Stewart holds that by merely examining whether the measures formulated by the state are reasonable, the Constitutional Court defeats the aim of purposive, contextual, and generous constitutional interpretation as envisioned by section 39 of the *Constitution*.<sup>858</sup> Although the court's efforts towards the recognition of the need for the conservation of natural resources is commendable, the court missed a valuable opportunity to give its perspective as to the content of the constitutional water right.

Fuo and Du Plessis<sup>859</sup> observe that socio-economic transformation in the light of the effects of Apartheid-era governance remains undesirably slow. The latter is so despite the constitutional commitment to providing social transformation. This transformation entails ensuring access to certain socio-economic rights such as water, attempts by

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<sup>851</sup> Du Plessis 2010 *RECIEL* 317.

<sup>852</sup> See para 2.5.2.2 above.

<sup>853</sup> See generally Humby and Grandbois 2010 *Les Cahiers de Droit*.

<sup>854</sup> Ngang 2014 *AHRLJ* 660.

<sup>855</sup> Ngang 2014 *AHRLJ* 660.

<sup>856</sup> Ngang 2014 *AHRLJ* 668.

<sup>857</sup> Kotzé 2010 *JHRE* 159.

<sup>858</sup> Stewart 2010 *Penn State International Law Review* 507.

<sup>859</sup> Fuo and Du Plessis 2015 *Law, Democracy and Development* 2.

authorities to implement these rights, as well as placing explicit duties on the state in this regard.<sup>860</sup> Consequently, persons continue to live in conditions of social hardships.<sup>861</sup>

In part, the slow progress with social transformation may be attributed to how the Constitutional Court has adjudicated on socio-economic rights cases.<sup>862</sup> For instance, Pieterse critiques the Constitutional Court for failing to provide normative content to particular socio-economic rights and holds that courts are expert interpreters and are, therefore, best suited to provide content to social rights and the specific standards of compliance they impose.<sup>863</sup> The Constitutional Court's interpretation and adjudication on such issues has a significant role to play in progress made as to the realisation of socio-economic rights, as well as socio-economic transformation. It can be said that the Constitutional Court must assume a more significant role in determining and promoting the normative content of socio-economic rights in their judgements to promote transformation, development, the achievement of equality and the advancement of human rights and freedoms.

There is more to be said on water as an *access* right in particular. Importantly, Thompson notes that the right is phrased as "access to sufficient water" instead of a right to "adequate water".<sup>864</sup> Thus, one may argue that even from the initial phrasing of the right, there is a lack of immediacy – again, perhaps with regard to the state's capacity to provide for this right. It is thus that the right does not entail the provision of water in all households, or for all undertakings. Instead, it envisions access by all persons to a long-term sustainable provision of water supply, and basic, minimum amount of potable water that is in close proximity to all households.<sup>865</sup>

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<sup>860</sup> Fuo and Du Plessis 2015 *Law, Democracy and Development* 2.

<sup>861</sup> Fuo and Du Plessis 2015 *Law, Democracy and Development* 2.

<sup>862</sup> Stewart 2010 *Penn State International Law Review* 492 – 493; Brand 2011 *Stell Law Review* 614- 638; Liebenberg *Socio-economic rights: Adjudicating under a transformative constitution* 131 – 227; Fuo and Du Plessis 2015 *Law, Democracy and Development* 3; Du Plessis 2011 *SAJHR* 281, 286, 287, 289.

<sup>863</sup> Pieterse 2004 *AJHR* 395.

<sup>864</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 146.

<sup>865</sup> This may be inferred from the *WSA*, see para 2.5.1.2 above; Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 146.

Du Plessis states that it remains essential for a country such as South Africa to balance the ever-increasing and potentially competing developmental demands against admittedly limited natural resources.<sup>866</sup> Du Plessis theorises that the future growth of the country and the enhancement of the quality of life of persons depend largely on the quality of people's environment, including their ability to live healthy lives.<sup>867</sup> The reduction of poverty, particularly in the country's urban and rural areas, is an integral precondition for the reduction of environmental issues such as water and soil pollution, and various other environmentally unsustainable practices (and vice versa).<sup>868</sup> Thus, one may conclude that during the development of policies and laws, and the fulfilment of their duties, local governments must consider the delicate balance between water poverty, developmental demands, and the environment.

Tying into the above debate is the issue of water security.<sup>869</sup> As per Soyapi, water security pertains to access to water of an acceptable quantity and quality that is sufficient for particular human needs, including for drinking and the promotion of livelihoods.<sup>870</sup> Furthermore, the strive towards water security involves ensuring the provision of sufficient and adequate water that meets both the basic standards for human health and well-being.<sup>871</sup> In terms of access, both the means to get water and the cost thereof, remain important. Soyapi postulates that the poor are more likely to suffer from water issues (resulting in water insecurity), but that does not mean that water should be free.<sup>872</sup> Instead, water users are generally expected to contribute economically so that access to water can be guaranteed.<sup>873</sup> The exception to the former being, of course, that where persons are unable to afford water, the state must facilitate the provision of their basic needs.<sup>874</sup>

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<sup>866</sup> See Du Plessis 2011 *SAJHR* 286.

<sup>867</sup> See Du Plessis 2011 *SAJHR* 286; see also Kotzé 2010 *JHRE* 135 – 160.

<sup>868</sup> See Du Plessis 2011 *SAJHR* 287.

<sup>869</sup> See paras 2.3.1.7 and 2.3.1.13 above.

<sup>870</sup> Soyapi 2017 *PELJ* 3; see also para 2.3.1.7 above.

<sup>871</sup> Soyapi 2017 *PELJ* 3.

<sup>872</sup> Soyapi 2017 *PELJ* 3 – 4.

<sup>873</sup> Soyapi 2017 *PELJ* 4.

<sup>874</sup> Gleick 1999 *Water Policy* 10.

## 2.6 Chapter summary

Although there is a wealth of information on the human right to water, and much more could be said on the international, African regional, and South African perspectives thereon, this chapter's objective was to primarily analyse and provide a broad contextualisation of the content on the human right to water from the perspectives mentioned above.<sup>875</sup> Due to the broad scope of this chapter's topic, each perspective was discussed at the hand of three categories, namely the law and policy, jurisprudence, and scholarly discourse on the human right to water. In terms of the law and policy, the chief angle of analysis was to determine the development of the right to water through the foremost legal instruments from each perspective.

The latter analysis also allowed for determining the content of the right to water from the different perspectives, while ascertaining the actions necessary towards the fulfilment of the right. The analysis of the judicial discourse allowed this study to determine how the right to water is interpreted by the courts from an international, African regional and South African perspective. Finally, an interrogation of the scholarly discourse provided for an understanding of how the right is interpreted by scholars from the aforementioned three perspectives, and assisted in the determination of the actions required from the relevant stakeholders to realise the right.

From the above section on the international perspectives concerning the human right to water,<sup>876</sup> it is evident that the concept has come a long way to find its feet in law and policy. While it is now internationally recognised, it places no legal obligation on states to enforce the right.<sup>877</sup> This must be done by the inclusion thereof in national law and policy. The same is true of the right to water in the African regional context, except that it has not been explicitly recognised as yet, and as such, remains a derivative right.<sup>878</sup>

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<sup>875</sup> See para 1.7 above.

<sup>876</sup> See para 2.3 above.

<sup>877</sup> See para 2.3 above.

<sup>878</sup> See para 2.4 above.

It is made clear that while the right has found its way to the courts in both the International and the African regional contexts,<sup>879</sup> it was mainly considered as a derivative right. Hence, international courts may yet have an important role to play in ensuring the realisation of this right. While the African Commission on Human and People's Rights had many opportunities to elaborate on the right to water as an individual right, it maintained its position by deriving the right from certain parent rights.

Given the inability of scholars to agree on an interpretation for this right, and the demanding nature thereof as a socio-economic right, it may be argued that states bear a great duty to bring the right to water to fruition. The discussion concerning the right to water from an international perspective, revealed that local authorities have an important role to play in implementing the right to water.<sup>880</sup> However, an opportunity exists for increased attention on how the human right to water may inform the efforts of local authorities in realising the right. As for the right itself in the international sphere, it is doubtful whether it, and the legal and scholarly discourse thereon, has fully matured.<sup>881</sup>

Again, the position is very similar in the African regional context.<sup>882</sup> A main difference is the lack of recognition concerning the potential role of cities or local authorities in fulfilling the right to water. To promote cities' position as a necessary stakeholder towards the fulfilment of the water right, the chapter considered the principle of subsidiarity.<sup>883</sup> In context, one may determine that, firstly, in order to secure the human right to water in from an African regional perspective, states should be encouraged to adopt the right into their domestic laws to counter-act the complexities surrounding the derivative nature of the right. Secondly, should states elect to do so, they may be guided by the principle of institutional subsidiarity by allocating the implementation of the right to water to local authorities. The latter measure should be guided by the institutional capacity of the various levels of governance, and, thus, an assessment of whether local authorities would in fact be the appropriate level of governance through which the right should be fulfilled.

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<sup>879</sup> See paras 2.3.2 and 2.4.2 above.

<sup>880</sup> See para 2.3 above.

<sup>881</sup> See para 2.3 above.

<sup>882</sup> See para 2.4 above.

<sup>883</sup> See para 2.4.3 above.

Fortunately, the right to water has been entrenched in the South African *Constitution*. However, from the analysis of the relevant laws, it is evident that the provision of water services is primarily a function of local government.<sup>884</sup> While this is admirable, given the above discussion of the courts' and scholars' interpretation and views on the right, it is evident that realising the constitutional right to water in South Africa is a difficult task and a multi-faceted issue.<sup>885</sup> Although no sphere of government can escape the general duty of the realisation of socio-economic rights in the country, the specific obligation to provide water supply services rests on local governments.<sup>886</sup>

While the existence of a competent, functional local government is essential to sustainable water provision, it will subsequently be shown that the proverbial legs of municipalities are buckling under the weight of the duty.<sup>887</sup> From this chapter, one may conclude that local governments face numerous challenges in terms of its function to provide water services to communities towards realising their constitutional water right, and that these issues remain to be solved. These issues present a relevant gap to be researched in this study. On this note, the following chapter applies an analytical lens to water service delivery. The latter analysis aims to determine specific water service delivery challenges that contribute to the slow progress made by South African cities towards realising their constitutionally entrenched water services delivery function.

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<sup>884</sup> See para 2.5 above.

<sup>885</sup> See paras 2.5.2 and 2.5.3 above.

<sup>886</sup> See para 2.5.1 above.

<sup>887</sup> See chapter 3 below.

## CHAPTER 3 WATER SERVICE DELIVERY CHALLENGES IN SOUTH AFRICAN CITIES

### 3.1 Introduction

While realising the right to water is deemed a shared responsibility of all levels of governance, South African municipalities are constitutionally tasked with the function of providing water services to communities.<sup>888</sup> Yet the burden on these cities weigh unimaginably heavy.<sup>889</sup> Thus, cities face various challenges that relate specifically to water service delivery. Although there may be innumerable, some of these challenges include the country's ever-increasing water stress; the perpetual socio-economic disparities of the past; the effects of climate change, such as prolonged droughts and changing weather patterns; widespread and systemic poverty; geographically unequal water availability and demand; as well as growing and urbanising populations.<sup>890</sup>

Rapid urbanisation and large populations create significant challenges in terms of effective and adequate water services provision. The phenomenon of urbanisation includes, for instance, the growing demand for clean water supplies and adequate sanitation, which is required to ensure and maintain human dignity.<sup>891</sup> Rapid urbanisation also increases the competition between sectors, such as agriculture and industry, for scarce water resources.<sup>892</sup> Moreover, unbridled urban growth poses significant environmental and socio-economic challenges to residents and government alike.<sup>893</sup> Bearing in mind the persistent, rapid rate of urbanisation in South Africa, one may regard it as a particularly worrying contributor to cities' water crises. Nearly 63% of South Africans are currently inhabiting cities, and this rate is expected to rise to 71% towards 2030.<sup>894</sup> Furthermore, by 2050, it is estimated that eight out of every ten people in South

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<sup>888</sup> Schedule 4 of Part B of the *Constitution*.

<sup>889</sup> See paras 3.2, 3.3 below and 2.5.3 above.

<sup>890</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 4.

<sup>891</sup> ITU *Smart water management in cities* 3.

<sup>892</sup> ITU *Smart water management in cities* 3.

<sup>893</sup> ITU *Smart water management in cities* 2.

<sup>894</sup> Parliamentary Monitoring Group 2019 <https://pmg.org.za/page/Urbanisation>.



Africa will be residing in urban areas.<sup>895</sup> Consequently, there is a growing demand for life-sustaining water in cities.

Due to the abovementioned pressure on cities' infrastructure and water supply systems, many municipalities are unable to reliably and sustainably meet the demand of consumers.<sup>896</sup> This has resulted in, for instance, the phenomenon of violent protests in response to poor service delivery becoming systemic, and the frequency thereof is dramatically accelerating over time.<sup>897</sup> Some investigations as to service delivery protests in certain areas of the country have concluded that deficient service delivery is often aggravated by inefficient management, poor governance, a lack of communication, the lack of effective client interfaces, as well as problems relating to unfunded mandates and affordability, amongst other issues.<sup>898</sup>

The challenges cities face in an effort to fulfil people's constitutionally entrenched right to water, however, runs even deeper and entails various pressing dichotomies. While municipalities are unable to meet the water demands of their consumers, the rate of non-revenue water in cities continuously escalates, with water loss estimates of 35% of the system input volume for South Africa in its entirety.<sup>899</sup> With water theft, or illegal water use, as well as leaking pipes and bad billing playing an undoubtedly large role in the country's water losses, it was said that by 2015 the water loss in the City of Johannesburg alone was enough to fill 87 743 Olympic sized swimming pools.<sup>900</sup>

Perhaps ironically, serious issues such as non-revenue water and the rate of properly functioning water infrastructure in South Africa may be entirely underestimated or

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<sup>895</sup> Parliamentary Monitoring Group 2019 <https://pmg.org.za/page/Urbanisation>.

<sup>896</sup> Makhari *Assessment of Water Service Delivery in the Municipalities of City of Tshwane, City of Cape Town and eThekwin* 1.

<sup>897</sup> Makhari *Assessment of Water Service Delivery in the Municipalities of City of Tshwane, City of Cape Town and eThekwin* 1.

<sup>898</sup> See generally Botes *et al* *The cauldron of local protests: Reasons, impacts and lessons learned*. Makhari *Assessment of Water Service Delivery in the Municipalities of City of Tshwane, City of Cape Town and eThekwin* 1.

<sup>899</sup> See para 1.3 above. Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 4.

<sup>900</sup> Rand Water 2015 [http://www.waterwise.co.za/export/sites/waterwise/downloads/main/2015\\_November\\_Water\\_Wise\\_newsletter\\_interactive.pdf](http://www.waterwise.co.za/export/sites/waterwise/downloads/main/2015_November_Water_Wise_newsletter_interactive.pdf).

misunderstood, given the insufficiency of data available on these problems.<sup>901</sup> This may be attributed to lacklustre monitoring and reporting efforts by cities, resulting in no or insufficient information.<sup>902</sup> Furthermore, the sustainability of water provision services and water infrastructure is another complex issue adding to the challenge of cities' mandate in ensuring that everyone has sufficient access to water.<sup>903</sup> Since water infrastructure is often built without the necessary operational plans, training, resources and support to maintain and operate such infrastructure, many new systems rapidly fall into disrepair.<sup>904</sup> This leaves consumers without access to water for often long periods of time, while cities continue to report an improvement in access to water solely based on the construction of new infrastructure.<sup>905</sup>

This chapter discusses water service delivery in South Africa, including briefly looking at the history of water service delivery in the country, while providing a more in-depth analysis to the current state of water services to adequately contextualise the milieu within which the subsequent challenges must be understood.<sup>906</sup> After this, four specific water service delivery challenges will be explored. These challenges include non-revenue water, illegal water use, insufficient data, and the sustainability of water services.<sup>907</sup> The aforementioned four challenges serve to scope the extent of the study.<sup>908</sup> Additionally, in reviewing the relevant literature during this study, it was revealed that not much attention has yet been paid to this particular coupling of challenges. An investigation into these challenges has not been attempted from a constitutional rights and interdisciplinary point of view, and with the aim of ultimately finding innovative avenues to address these challenges.

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<sup>901</sup> See para 3.3.3 below.

<sup>902</sup> See para 3.3.3 below.

<sup>903</sup> See para 3.3.4 below.

<sup>904</sup> See para 3.3.4 below.

<sup>905</sup> See para 3.3.4 below.

<sup>906</sup> See para 3.2 below.

<sup>907</sup> See para 3.3.1 – 3.3.4 below.

<sup>908</sup> See paras 3.3.1 – 3.3.4 below.

### 3.2 On water service delivery

South Africa's water service delivery history is rather grim.<sup>909</sup> Before 1994, significant inequities in water services between various racial groups existed; only an estimated 45% of black persons had access to water, in contrast to nearly 100% water access in other groups.<sup>910</sup> Thompson *et al* attribute this water inequality to various factors, such as the absence of clear responsibilities due to a non-existent institutional framework, absence of coherent water policies, the lack of political legitimacy and will, low levels of economic activity in vulnerable areas, failure to provide resources to persons who were in need of it most, and the overlapping of institutional boundaries as well as the exclusion of many areas that were in pronounced need.<sup>911</sup> Due to racial segregation and the overall fragmentation of water supply management, different quality and levels of water services were provided between black and white areas.<sup>912</sup>

The first democratic government in post-1994 South Africa immediately embarked on harmonising water service provision and reached out to previously disadvantaged persons, evident by the drastic legislative reform by, especially, the *NWA* and the *WSA*.<sup>913</sup> Government consulted local and international experiences to establish a clear law and policy framework. This framework is based on the principles of equality for all and universal human rights, and promotes ideas such as demand-driven and community-based development, "some for all" instead of "all for some" approaches, and that basic services are part of human rights.<sup>914</sup>

However, more than 20 years later, less than half of all households in the country obtain their water supply from taps located in their homes, while approximately 27% of persons have access to a tap on their property, and 12% need to walk less than 200 metres to obtain water.<sup>915</sup> An estimated 6% of persons have access to piped water at a distance

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<sup>909</sup> See generally Thompson *et al* *Policies, Legislation and Organizations Related to Water in South Africa, with Special Reference to the Olifants River Basin*.

<sup>910</sup> Folifac 2012 *African Water Journal* 8 – 12.

<sup>911</sup> Thompson *et al* *Policies, Legislation and Organizations Related to Water in South Africa, with Special Reference to the Olifants River Basin* 42. Folifac 2012 *African Water Journal* 8 – 12.

<sup>912</sup> Folifac 2012 *African Water Journal* 8 – 12.

<sup>913</sup> Folifac 2012 *African Water Journal* 8 – 12.

<sup>914</sup> Folifac 2012 *African Water Journal* 8 – 12.

<sup>915</sup> WWF-SA *Water: Facts and Figures* 63.

larger than the 200 metre target indicated for so-called basic services.<sup>916</sup> However, around 9% of the populace, predominantly located in rural and township areas in the Eastern Cape, Limpopo, KwaZulu-Natal, and Mpumalanga, have no access to piped water.<sup>917</sup> A large portion of the country's population resides in informal settlements (approximately 7 270 000 people), yet the availability of water facilities, the operation thereof, as well as the safety of the water provided is considered insufficient.<sup>918</sup> The latter emphasises the problem of unequal access to water in urban localities.

Arguably, such discrepancies in living standards, including the phenomenon of urban poverty and the related role of water provision, may undermine the long-term sustainability of South Africa's democratic order, founded on "human dignity, the achievement of equality and the advancements of human rights and freedoms".<sup>919</sup> Unequal access to adequate water services in urban areas crystallises the juxtaposition of opulence and extreme poverty<sup>920</sup> that persists after the Apartheid-era governance. Some authors suggest that the mere absence of water services is a manifestation of poverty.<sup>921</sup> While access to adequate water services is constitutionally mandated, and an essential component of urban development policies, one-half of people living in urban areas are consumed by absolute poverty.<sup>922</sup> Thus, it is safe to say that South African cities have a long way to go in terms of water services provision.

As stated previously, South Africa is a water-scarce<sup>923</sup> or water-stressed country<sup>924</sup> and is considered the 30<sup>th</sup> driest country in the world.<sup>925</sup> The water resources that are available to the country's inhabitants are extremely limited in extent.<sup>926</sup> In 2005, just over

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<sup>916</sup> WWF-SA *Water: Facts and Figures* 63.

<sup>917</sup> WWF-SA *Water: Facts and Figures* 63.

<sup>918</sup> See generally Danti *Critical assessment of right to safe water and sanitation in a South African informal settlement: A Case Study of Marikana, Cape Town*.

<sup>919</sup> See s 1(a) of the *Constitution*. See also Nleya 2008 *Development Southern Africa* 269.

<sup>920</sup> Nleya 2008 *Development Southern Africa* 269.

<sup>921</sup> Mugambi and Kebeab *Fresh Water to Eradicate Poverty* 8; Nleya 2008 *Development Southern Africa* 269.

<sup>922</sup> Nleya 2008 *Development Southern Africa* 269.

<sup>923</sup> Preamble of the *NWA*; Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 7.

<sup>924</sup> Water Wise 2019 <http://www.waterwise.co.za/site/water/environment/situation.html>.

<sup>925</sup> Gerbi 2017 <https://ewn.co.za/2017/11/28/sa-ranked-30th-driest-country-in-the-world>.

<sup>926</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 7.

1200 kilolitres of freshwater were available for every person per year of the then estimated population of 42 million. In 2019, South Africa had a population of approximately 58 million.<sup>927</sup> The demand for water in cities is vastly affected by this since the more significant part of South Africa's population resides in urban areas.<sup>928</sup> This exponential growth in population, coupled with an urgent water supply need and an ever-developing economy, has severely affected cities' water resource availability.<sup>929</sup>

Ultimately, there is still room for improvement in terms of the delivery of water services by municipalities in cities, especially concerning access to water and the governance of these services. In the case of *Federation for Sustainable Environment v Minister of Water Affairs*,<sup>930</sup> for example, the residents of Siobela, Caropark, and Carolina in Mpumalanga had no access to potable water resulting from acid mine drainage in the area.<sup>931</sup> In an attempt to relieve the situation, the Municipality installed JoJo tanks to supply drinking water to the community. However, the Municipality failed to refill the tanks, and the community had to walk long distances to gain access to potable water.<sup>932</sup> The court held that the Municipality is obliged to urgently remedy the violation of their right to access to sufficient water, and ordered the Municipality to provide potable water to the community on an interim basis.<sup>933</sup> In the longer term, the Municipality had to report on their plans to restore water access to the community.<sup>934</sup>

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<sup>927</sup> Worldometers 2019 <https://www.worldometers.info/world-population/south-africa-population/>.

<sup>928</sup> World Population Review 2019 <http://worldpopulationreview.com/countries/south-africa-population/>.

<sup>929</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 7.

<sup>930</sup> *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC). For a discussion on this case, see generally Fuo 2013 *Murdoch University Law Review*. See also *Residents of Bon Vista v Southern Metropolitan Local Council* 2002 6 BCLR 625 (W); *Nokotyana v Ekurhuleni Metropolitan Municipality* 2010 4 BCLR 312 (CC) amongst others.

<sup>931</sup> *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC) 5.

<sup>932</sup> *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC) 5 – 7.

<sup>933</sup> *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC) 18 – 19.

<sup>934</sup> *Federation for Sustainable Environment v Minister of Water Affairs* 2012 35672/12 128 (ZAGPPHC) 18 – 19.

While water service delivery failures on the part of cities remain prevalent,<sup>935</sup> the state of affairs is often exacerbated by issues such as the non-payment of water services and its impact on non-revenue water levels in cities, which, as will be discussed below, are already irreconcilably high.<sup>936</sup> It is held that consumers may have less incentive to save water in circumstances where their intention to pay for it is absent.<sup>937</sup> Cost-recovery is not part of the non-revenue water calculation in either South Africa or globally.<sup>938</sup> In fact, non-revenue water is calculated based on the "billed authorised" information provided by municipalities' financial departments.<sup>939</sup> This information does not account for the payment of a bill, but rather whether it has been issued. Once a water bill has been issued by a municipality, it is categorised as part of billed consumption, regardless of whether payment is ultimately received.<sup>940</sup>

According to National Treasury, as at the end of June 2019, municipal consumer debt is estimated at R165.5 billion, which is a significant increase from the previous year's R143.2 billion.<sup>941</sup> Of this, the largest outstanding component of debtors is households, at 71.7%, and owing R118.6 billion.<sup>942</sup> The 2014/2015 South African Living Conditions Survey revealed that while 83% of the respondents were provided with water services, a mere 35% paid for water usage.<sup>943</sup> The survey also indicated that certain socio-economic characteristics of households influence their willingness and ability to pay for water services.<sup>944</sup> Based on the survey's findings, authors have recommended that the South African water policy should take into account issues such as income inequality, gender-sensitive water management and education, and raise awareness for prompt water tariff payment, to encourage sustainable water supply.<sup>945</sup>

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<sup>935</sup> See, for example, *Unemployed Peoples Movement v Premier, Province of the Eastern Cape* 2020 5 BCLR 573 (ECG); *Mshengu v Msunduzi Local Municipality* 2019 JOL 45319 (KZP); *Ngaka Modiri Molema District Municipality v Chairperson, North West Provincial Executive Committee* 2014 (ZACC) 31.

<sup>936</sup> See para 3.3.1 below.

<sup>937</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* vi.

<sup>938</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* vi.

<sup>939</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* v.

<sup>940</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* v.

<sup>941</sup> Parliamentary Monitoring Group 2019 <https://pmg.org.za/committee-meeting/29170/>.

<sup>942</sup> Parliamentary Monitoring Group 2019 <https://pmg.org.za/committee-meeting/29170/>.

<sup>943</sup> Akinyemi, Mushunje and Fashogbon 2018 *Cogent Social Sciences* 1.

<sup>944</sup> Akinyemi, Mushunje and Fashogbon 2018 *Cogent Social Sciences* 1.

<sup>945</sup> Akinyemi, Mushunje and Fashogbon 2018 *Cogent Social Sciences* 1.

All of the aforementioned issues contribute to the ever-increasing complexity cities face in ensuring that everyone has sufficient access to water by providing equal and adequate water services. While there are many more challenges cities may encounter, this study is scoped to analyse four specific challenges currently affecting water service provision, as mentioned above.<sup>946</sup> These challenges will be discussed in the following section.

### **3.3 Specific challenges in cities**

This section aims to analyse four specific challenges, namely, non-revenue water, illegal water use, insufficient data and the sustainability of water services. The purpose for the investigation that follows is to gather a deeper understanding of these challenges, with a view to later determine possible avenues to address the challenges.<sup>947</sup> After evaluating and investigating each challenge, the final section aims to provide certain solutions or avenues for cities to pursue in tending to these challenges.

#### ***3.3.1 Non-revenue water***

Municipalities view water as a critical resource, particularly considering their constitutionally entrenched water service provision mandate. The Drakenstein Municipality, for instance, emphasises that it considers its water infrastructure as a strategic asset, in addition to treating the effective and integrated management of the municipality's water resources and systems as a fundamental aspect of its business strategy.<sup>948</sup> Not only do water losses have a material financial bearing on constrained South African municipalities (since they are required to pay for water that cannot be billed to consumers)<sup>949</sup> but it compromises their ability to provide access to sufficient water to their community. With this in mind, municipalities are required to prioritise the minimisation of water losses.

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<sup>946</sup> See para 3.3 above.

<sup>947</sup> See chapter 5 and 6.

<sup>948</sup> Drakenstein Municipality *Water Management and Loss Control Policy 3*.

<sup>949</sup> Drakenstein Municipality *Water Management and Loss Control Policy 3*.

Non-revenue water is described as the difference between the volume or amount of water flowing into a water distribution system and the volume that is billed to users.<sup>950</sup> It is generally accepted that non-revenue water comprises of three main components, namely physical or real losses, commercial or apparent losses, and, finally, unbilled authorised consumption of water.<sup>951</sup> So-called real losses are defined as consisting of both leakage and evaporative losses from storage facilities, conveyance systems, overflows from storage units, and process losses at water treatment plants.<sup>952</sup> Real or physical losses may also be caused by poor maintenance and operations, inadequate quality of underground assets, the lack of continuous and active leakage control, amongst other issues.<sup>953</sup>

Conversely, apparent losses are said to include the unauthorised consumption of water, as well as administrative and measurement inaccuracies.<sup>954</sup> Commercial losses are furthermore caused by customer meter under-registration and data processing errors.<sup>955</sup> Unbilled authorised consumption comprises of water used for firefighting and mains flushing, amongst other things.<sup>956</sup> In contrast to both physical and commercial losses, unbilled authorised consumption entails a public policy decision that allocates water for certain purposes without any monetary compensation, rather than reflecting any operational inefficiencies.<sup>957</sup>

Authors such as Gumbi and Rangongo<sup>958</sup> postulate that many municipalities ignore the issue of non-revenue water. The Department of Water and Sanitation's (hereafter, the

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<sup>950</sup> Kingdom, Liemberger and Marin *The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries* 1; Hedden *Parched Prospects II: a revised long-term water supply and demand forecast for South Africa* 10 – 11;

<sup>951</sup> For a general discussion on non-revenue water, see González-Gómez, García-Rubio and Guardiola 2011 *Water Resources Development* 345 – 360.

<sup>952</sup> SALGA *Framework for Water Conservation and Demand Management* 6.

<sup>953</sup> Kingdom, Liemberger and Marin *The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries* 1.

<sup>954</sup> SALGA *Framework for Water Conservation and Demand Management* 6.

<sup>955</sup> Kingdom, Liemberger and Marin *The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries* 1.

<sup>956</sup> Gumbi and Rangongo "Factors that Hinder Effective Management and the Supply of Clean Potable Water at eThekweni Municipality in KwaZulu-Natal" 625.

<sup>957</sup> Kingdom, Liemberger and Marin *The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries* 1.

<sup>958</sup> Gumbi and Rangongo "Factors that Hinder Effective Management and the Supply of Clean Potable Water at eThekweni Municipality in KwaZulu-Natal" 625.



DWS) *Master Plan*<sup>959</sup> stipulates that non-revenue water levels in municipalities are approximately at an average of 41%, which means that nearly half of the water entering municipal distribution systems is lost. Resultantly, municipalities are losing an estimated R9.9 billion of potential revenue annually.<sup>960</sup> While it is not mentioned in the above document, it is clear that if such a large amount of water never reaches the consumers, municipal service delivery is also detrimentally affected. It is therefore deemed critical for municipalities to address non-revenue water, particularly by implementing water demand and conservation strategies.<sup>961</sup>

Water conservation is understood as the minimisation of waste or loss, the protection and care of water resources, as well as the efficient and effective use of water.<sup>962</sup> Overall, water conservation requires the effective management and protection of water resources and is considered an objective for both water services institutions, and during water resource management.<sup>963</sup> Water conservation strategies are essential and should take into consideration the adverse effects of global climate changes and the persistent water scarcity in the country.<sup>964</sup> Water demand management, on the other hand, involves both the adaptation and implementation of a strategy by either a water institution or consumer to influence the water usage and demand to meet objectives, such as social development, social equity, economic efficiency, environmental protection, political acceptability, and the sustainability of water provision and services.<sup>965</sup> Most commonly, water demand management is construed as the reduction of water that is unaccounted for, or the reduction of consumer demand, or the combination of both.

Addressing non-revenue water through water conservation and water demand strategies are fundamental to ensure the country meets the goals determined by the *NDP*.<sup>966</sup> For instance, the *NDP* determines that water demand should be reduced to 15% below the

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<sup>959</sup> Volume 1 of the *Master Plan* 60.

<sup>960</sup> Volume 1 of the *Master Plan* 60.

<sup>961</sup> *Master Plan* 60; DWS *Guideline for the Development and Implementation of Water Conservation and Water Demand Management Plans for the Mining Sector* 2016 i.

<sup>962</sup> *National Water Conservation and Water Demand Management Strategy* 2004 6.

<sup>963</sup> City of Cape Town *Long-term Water Conservation and Water Demand Management Strategy* 2007 40.

<sup>964</sup> City of Cape Town *Long-term Water Conservation and Water Demand Management Strategy* 2007 40.

<sup>965</sup> *National Water Conservation and Water Demand Management Strategy* 2004 6

<sup>966</sup> See paras 1.4 above and 4.3.1.14 below.

"business-as-usual scenario" in urban areas by 2030.<sup>967</sup> While proper water demand management, in particular, may be seen as a solution to non-revenue water, it may as well be identified as part of the current problem, i.e., that there is a lack of proper water conservation and water demand management in municipalities that report high non-revenue water.<sup>968</sup>

As the City of Cape Town's *Long-term Water Conservation and Water Demand Management Strategy* holds, the role of water conservation and water demand management is, primarily, to free up water which is used inefficiently, to provide water to under-serviced persons. The purpose of the latter is not to cause a negative demand growth, but rather to offset the average growth in demand. Consequently, although non-revenue water chiefly consists of, and is caused by, physical losses, commercial losses, and unaccounted for water use, the crux of this problem lies with adequate water conservation and water demand management, or more precisely, the lack thereof.

Exacerbating the situation above is the well-recognised fact that there exists a lack of data in municipalities on non-revenue water.<sup>969</sup> While the issue of insufficient data will be addressed below,<sup>970</sup> it suffices to say that the last nation-wide analysis of non-revenue water in municipalities was undertaken in 2012 by the Water Research Commission.<sup>971</sup> A report titled *State of Non-Revenue Water in South Africa* was published based on the latter investigation,<sup>972</sup> and it is still often cited as the only comprehensive data available on non-revenue water in the country.<sup>973</sup>

Given that the above report indicates that researchers could obtain data from only 132 of the possible 237 municipalities in South Africa at that time,<sup>974</sup> the report can by no

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<sup>967</sup> NDP 65.

<sup>968</sup> 2030 Water Resources Group 2020 <https://www.2030wrg.org/southafrica-stories/>.

<sup>969</sup> Makou 2017 <https://africacheck.org/reports/many-sa-municipalities-lose-water-national-average-37-dont-know/>; Hedden *Parced Prospects II: A revised long-term water supply and demand forecast for South Africa* 11; Bhagwan, Wegelin and Sigalaba 2013 <http://www.wrp.co.za/about/articles/benchmarking-non-revenue-water-experiences-south-africa>.

<sup>970</sup> See para 3.3.4 below.

<sup>971</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)*.

<sup>972</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)*.

<sup>973</sup> Makou 2017 <https://africacheck.org/reports/many-sa-municipalities-lose-water-national-average-37-dont-know/>.

<sup>974</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* iii.

means be considered a true reflection of the current state of non-revenue water in South Africa. While the report provides that the estimated level of non-revenue water for the country is 36.8%, it remains a mere approximation.<sup>975</sup> A separate report from the 2013/2014 year considered 152 datasets in an effort to create municipal benchmarks for water service delivery, of which 99 datasets revealed that the national non-revenue water for that year was 34%.<sup>976</sup>

Seven years have since passed after the publication of the last report. As pointed out on the Africa Check website on the matter of non-revenue water, the data concerning water supply and loss is too unreliable to publish.<sup>977</sup> It is held, for instance, that data provided by the City of Tshwane for the 2014/2015 financial year indicates a water supply loss of 85 723 303 kilolitres of the 105 807 911 supplied to the city.<sup>978</sup> Although this is approximately 81% of the city's water that was lost in that year, the metro's annual report indicated a mere loss of 23.33%.<sup>979</sup>

The limited data that is available on non-revenue water indicates that the issue is not only complicated but also varies between the different sized municipalities in the country. According to a 2013 report, non-revenue water for secondary cities<sup>980</sup> was reportedly higher than for metros in the year 2012, at 39.4%, whereas metros accounted for approximately 33.8% of water losses.<sup>981</sup> The former is notwithstanding the fact that metro water systems are of a significantly larger scale. The report further indicates that most of the secondary cities in South Africa find themselves in a potential water crisis and require urgent intervention regarding the massive non-revenue losses to ensure water security and sustainable water use.<sup>982</sup>

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<sup>975</sup> McKenzie, Sigalaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* iii.

<sup>976</sup> The Municipal Benchmarking Initiative *Annual Report on Water Services in South Africa 2015* 25.

<sup>977</sup> Makou 2017 <https://africacheck.org/reports/many-sa-municipalities-lose-water-national-average-37-dont-know/>.

<sup>978</sup> Makou 2017 <https://africacheck.org/reports/many-sa-municipalities-lose-water-national-average-37-dont-know/>.

<sup>979</sup> *City of Tshwane Annual Report 2014/2015* 110; Makou 2017 <https://africacheck.org/reports/many-sa-municipalities-lose-water-national-average-37-dont-know/>.

<sup>980</sup> Secondary cities may be understood as large but non-metro cities. For an in-depth discussion on secondary cities in South Africa, see generally John *Secondary Cities in South Africa: The start of a conversation*.

<sup>981</sup> Department of Water Affairs *Secondary City Non-Revenue Water Loss Assessment* iv.

<sup>982</sup> Department of Water Affairs *Secondary City Non-Revenue Water Loss Assessment* iv.

To better comprehend non-revenue water as a challenge to the water provision function of cities, it is essential to consider each of its proposed elements separately. This is because a thorough understanding of each of the elements is necessary to (in subsequent chapters of the study) determine appropriate measures to comprehensively address the challenge of non-revenue water. Failing such an investigation, the measures identified may lack adequacy and could result in the challenge being addressed on a superficial level.

### *3.3.1.1 Physical or real losses*

The World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* identifies the three main components of physical losses as leakage from transmission and distribution mains, leakage, and overflows from the utility's storage tanks and reservoirs, and leakage from service connections up to the consumer's water meter.<sup>983</sup> The first and second components of physical losses usually are quite visible to either the public or water utility staff, rendering it easier to detect and repair. Leakages resultant from the third component is more challenging to detect or identify, which often leads to a higher volume of physical losses.<sup>984</sup>

Leaks resultant from either transmission or distribution mains usually are significant events, often catastrophic, and may cause damage to, for instance, highway infrastructure or vehicles.<sup>985</sup> Although such bursts may cause disruptions in supply, they are not always severe, since they are substantial and visible, and are therefore reported swiftly, shut off soon afterward, and repaired.<sup>986</sup> On the other hand, while leakage from a water utility's water storage and overflow tanks is self-explanatory and often easily quantifiable, repairing leaks of this nature is often an immense operation.<sup>987</sup> Repairing a water reservoir, for instance, may involve draining the reservoir while planning alternative supplies of water in order to prevent significant water outages.<sup>988</sup> It is, therefore,

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<sup>983</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 45.

<sup>984</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 45.

<sup>985</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 45.

<sup>986</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 45.

<sup>987</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 46.

<sup>988</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 46.

necessary for municipalities to do regular maintenance on reservoirs, and perform regular leakage tests. Finally, losses caused by leakage on customers' service connections running up to their meters, more often than not, result in the most substantial volume of physical water losses.<sup>989</sup> This is so, given the difficulty in detecting these kinds of leaks, and the fact that they often remain undetected for long periods.

Having determined where leaks may occur within the distribution and transmission network, it is necessary to identify the different types of leaks that water utilities may experience, considering their effect on the total amount of physical water losses. The first kind is background leaks or losses, which consist of weeping joints or small leaks, and are often individual events.<sup>990</sup> Losses of this kind are especially problematic since they are either stumbled upon by chance, or worsen over time to the extent that they are found by active leak detection surveys, and usually are not cost-effective to detect and repair individually.<sup>991</sup> Secondly, reported leaks are those that are visible and therefore reported quickly, either by the public or utility staff.<sup>992</sup> Thus, such leaks may have a short awareness time. Finally, unreported leaks or bursts are those that occur underground and are not visible on the surface.<sup>993</sup> Usually, the latter-mentioned leaks have a lengthy awareness time and are discovered during leak detection surveys.

A leaking tap, pipe, or toilet can typically waste approximately 30 litres of water per hour.<sup>994</sup> Multiply the latter over thousands of leaking taps and pipes countrywide, and the inevitable result is an enormous loss of water. Due to the magnitude of the problem, the DWS launched the "War on Leaks" programme in 2015 to drastically reduce non-revenue water in South African municipalities.<sup>995</sup>

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<sup>989</sup> A distinction must, therefore, be drawn between leaks before the consumer's meter, and those that occur 'after' the consumer meter. The latter does not amount to non-revenue water.

<sup>990</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 46.

<sup>991</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 46 – 47.

<sup>992</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 47.

<sup>993</sup> World Bank Institute's *The Manager's Non-Revenue Water Handbook for Africa* 47.

<sup>994</sup> Williams 2015 <https://www.gov.za/blog/saving-water-loss-fixing-wasteful-leaks>.

<sup>995</sup> Williams 2015 <https://www.gov.za/blog/saving-water-loss-fixing-wasteful-leaks>. Another significant project on water losses is Operation Gcin'amanzi, which was established by Johannesburg Water in Soweto in 2003; see Veriava 2019 *African Studies* 590 – 608.

The programme mentioned above involves training approximately 15 000 young scholars as water agents and plumbers, after which they would be deployed to communities to investigate and repair leaks while raising awareness on water conservation.<sup>996</sup> The programme further entailed training qualifying youth (those who have obtained a matric certificate, or N3 with maths and science) as electricians, fitters and turners, instrument mechanics, and welders.<sup>997</sup> The trained artisans would then be deployed to municipalities countrywide to effect retrofitting, repairs, and replacements on faulty water infrastructure.<sup>998</sup> The rationale behind the War on Leaks programme seems to be the training and edification of youth, job creation, and, ultimately, the reduction of non-revenue water. While the programme was ambitious from the start, thousands of young persons did undergo training, but have reportedly not been absorbed into municipalities.<sup>999</sup>

The model of the programme has proven problematic since it lacked research on where learners would be placed after the completion of their training. It has come to light that the municipalities where the trainees were meant to find employment had not been consulted.<sup>1000</sup> Moreover, placing trainees for the practical experience required to graduate proved challenging as well, since no agreements were established beforehand with any host institutions or municipalities.<sup>1001</sup>

Hence, nearly five years and R2.6 billion later, the effectiveness and tangible impact of perhaps the country's most extensive programme focused on non-revenue water, mainly dealing with physical losses, has been called into question.<sup>1002</sup> A 2019 report on the War on Leaks programme indicates that only five electrical artisans have been permanently placed in different Gauteng based companies.<sup>1003</sup> A technical team has been established

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<sup>996</sup> See Portfolio Committee: Water and Sanitation *War on Leaks Report* 1 – 21; Williams 2015 <https://www.gov.za/blog/saving-water-loss-fixing-wasteful-leaks>.

<sup>997</sup> Williams 2015 <https://www.gov.za/blog/saving-water-loss-fixing-wasteful-leaks>.

<sup>998</sup> Muller *Money Down the Drain: Corruption in South Africa's water sector* 23 – 26; Williams 2015 <https://www.gov.za/blog/saving-water-loss-fixing-wasteful-leaks>.

<sup>999</sup> Portfolio Committee: Water and Sanitation *Media Statement: Water and Sanitation Committee Welcomes Rethink on War on Leaks Programme* 1.

<sup>1000</sup> Muller *Money Down the Drain: Corruption in South Africa's water sector* 23 – 26.

<sup>1001</sup> Muller *Money Down the Drain: Corruption in South Africa's water sector* 23 – 26.

<sup>1002</sup> Portfolio Committee: Water and Sanitation *Media Statement: Water and Sanitation Committee Welcomes Rethink on War on Leaks Programme* 1.

<sup>1003</sup> Portfolio Committee: Water and Sanitation *War on Leaks Report* 20.

to look into the placement of the reported 5580 trained youth.<sup>1004</sup> The technical team is said to engage with the South African National Defence Force, the Water Research Commission, and the DWS regarding the placement of the trained artisans.<sup>1005</sup> From this, it is apparent that although the programme has yielded at least one-third of its envisioned trained youth, it has not done anything to actively attend to the issue of the estimated R7 billion annual water loss in municipalities.

Although the results from the War on Leaks have been more than lacklustre, the DWS indicated in 2019 that it would be completed, and recommitted itself to funding the finalisation thereof.<sup>1006</sup> Nevertheless, due to the lack of proper planning and coordination in the War on Leaks programme, and many other questionable issues,<sup>1007</sup> currently, there is little to show for the massive expenditure that occurred. Finally, the chief problem persists; pipes, taps, toilets, and other infrastructure in cities continue to leak water and are effectively leaking money, if the cost of the water, energy for pumping, and treatment chemicals are considered.<sup>1008</sup>

The question remains if the country's foremost project concerning non-revenue water, particularly physical losses, in municipalities has not delivered in terms of its aim to reduce water losses by training young persons to fix leaks and spread awareness, what does the current situation concerning physical losses look like for cities? According to the 2020 Budget Review, non-revenue water (including water conservation and water demand management) is listed as a substantial infrastructure project, with a project cost between R35 – R50 billion.<sup>1009</sup> While the current status of the project is pre-feasibility, it entails improving water infrastructure to reduce water losses, while improving metering, amongst other issues.<sup>1010</sup> The budget indicates a significantly larger budget for projects

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<sup>1004</sup> Portfolio Committee: Water and Sanitation *War on Leaks Report 20*.

<sup>1005</sup> Portfolio Committee: Water and Sanitation *War on Leaks Report 20*.

<sup>1006</sup> South African Government News Agency 2019 <https://www.sanews.gov.za/south-africa/department-set-improve-war-leaks-programme>; Parliament of the Republic of South Africa 2020 <https://www.parliament.gov.za/press-releases/revamp-war-leaks-and-drought-intervention>.

<sup>1007</sup> For instance, while many of the trainees graduated as "water agents" after completing their practical placements, their qualifications are not formally recognised. The quality of the training can, therefore, not be verified. For other issues, see Muller *Money Down the Drain: Corruption in South Africa's water sector* 25 – 26.

<sup>1008</sup> Muller *Money Down the Drain: Corruption in South Africa's water sector* 23.

<sup>1009</sup> National Treasury *Budget Review 2020* 152.

<sup>1010</sup> National Treasury *Budget Review 2020* 152.

such as water reuse and the establishment of water and sanitation private sector participation.<sup>1011</sup> It is, however, evident that the government considers the issue of non-revenue water a priority in the water and sanitation sector.

Considering the 2018/2019 report of Johannesburg, South Africa's largest city, the above concern is well-substantiated, indicating a staggering non-revenue water rate of 38.6%, with physical losses representing the most substantial contribution of 18.1%.<sup>1012</sup> The latter rate is a 0.2% increase compared to the previous year's 38.4%, which is not only of significant concern to city management but is well above the target rate of 35%. Johannesburg experienced a substantial increase in water demand, which is linked to the system input volume and, therefore, closely linked to non-revenue water.<sup>1013</sup> For instance, a 10.9% increase was noted in the Soweto region, which has primarily been ascribed to leaking reservoirs and property leaks.<sup>1014</sup> Even more, the Zandfontein South region's North East Areas bulk meter displayed an increase of 11.05% in consumption, resultant from the rezoning of the Alexandra zone to include three more supply zones, which entail high numbers of internal property leaks.<sup>1015</sup>

Unfortunately, Johannesburg is not the only South African city suffering from severe non-revenue water issues. In the late 2000s, Nelson Mandela Bay Metropolitan Municipality already reported a 40% non-revenue water rate and was faced with a severe drought at the same time.<sup>1016</sup> The municipality had to take drastic action and identified and implemented priority interventions, half of which related to mitigating physical losses. Interventions such as bulk metering and bulk pipeline management, leak repairs, and pressure management were set in place.<sup>1017</sup> Even with a Non-Revenue Water Programme and several interventions in place, the city experienced various peaks in non-revenue

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<sup>1011</sup> National Treasury *Budget Review 2020* 152.

<sup>1012</sup> Johannesburg Water *Integrated Annual Report 2018/2019* 48.

<sup>1013</sup> Johannesburg Water *Integrated Annual Report 2018/2019* 48.

<sup>1014</sup> Johannesburg Water *Integrated Annual Report 2018/2019* 48.

<sup>1015</sup> Johannesburg Water *Integrated Annual Report 2018/2019* 48.

<sup>1016</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non-Revenue Water Programme – "Providing Sustainable Water Supply Services to Nelson Mandela Bay" 170.

<sup>1017</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non-Revenue Water Programme – "Providing Sustainable Water Supply Services to Nelson Mandela Bay" 170.



water, such as 55.8% in the third quarter of the 2014/2015 year, and 46.8% in the second quarter of the 2017/2018 year.<sup>1018</sup>

According to the 2018/2019 report for eThekweni Municipality, non-revenue water in this city is at 36.85%, barely not meeting its target of 36% for the particular financial year.<sup>1019</sup> The city indicates that theft, vandalism, and ageing water-related infrastructure are some of the main reasons for the variance.<sup>1020</sup> As per the Oversight Report of the 2018/2019 annual report, an increase from 32.7% in 2017/2018 to 36.85% in 2018/2019 was noted.<sup>1021</sup> The Oversight Report further states that the current rate is far from the targeted and sustained rate of 25%, and urges the municipality to urgently embark on a massive water infrastructure upgrade while looking into creative funding models to address this issue adequately.<sup>1022</sup>

From the above deliberation, one may derive that physical losses, as a category of non-revenue water containing various elements and types of losses, may be viewed as an immense challenge to be reckoned with, even on its own. Physical losses often form the largest percentage of non-revenue water in cities and may also be considered the priciest category for cities to address since the majority of physical losses is due to infrastructure or metering related problems. Of further great concern is the lack of progress made by the national War on Leaks programme in terms of addressing and reducing water loss through leaks. Although this programme constitutes intervention on the national level aimed at assisting cities to reduce physical losses via the fixing of leaks, its method is questionable and ineffective.

### *3.3.1.2 Commercial or apparent losses*

As briefly mentioned above, commercial or apparent losses generally consist of unauthorised consumption and unauthorised connections, as well as technical and

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<sup>1018</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non-Revenue Water Programme – "Providing Sustainable Water Supply Services to Nelson Mandela Bay" 170.

<sup>1019</sup> eThekweni Municipality *Annual Report 2018/2019* 663.

<sup>1020</sup> eThekweni Municipality *Annual Report 2018/2019* 663.

<sup>1021</sup> eThekweni Municipality *Oversight Report 2018/2019* 66.

<sup>1022</sup> eThekweni Municipality *Oversight Report 2018/2019* 66.

administrative inaccuracies related to consumer metering and billing.<sup>1023</sup> While greater focus will be placed on the issue below,<sup>1024</sup> an unauthorised connection essentially amounts to water theft and is defined as a water connection to a user that was not authorised or installed by the municipality.<sup>1025</sup> It may also include a water connection that has been tampered with deliberately to reduce or eradicate the metered water consumption.

Apparent losses resultant from metering inaccuracies may be vastly different from one municipality to the next and may depend on the class or type of meter, the water quality, air surges, and installation requirements.<sup>1026</sup> Finally, technical and administrative errors may include data transfer and management inaccuracies, which is understood as the variance between the true metered consumption and the metered consumption that was billed.<sup>1027</sup> Such errors frequently occur due to issues such as estimated readings, data entry errors, meter factor mistakes, meters that are not captured on the municipality's billing system, and billing corrections that do not take into account volume corrections.<sup>1028</sup>

Apparent losses are regarded as more significant in monetary terms since they are calculated at the retail water rate, whereas other losses are calculated at variable production prices.<sup>1029</sup> However, over the years, metering errors have been identified as the biggest contributor to apparent losses in a municipality.<sup>1030</sup> As per the City of Tshwane's report on *Mechanisms to Reduce Non-Revenue Water (Commercial Losses)*,<sup>1031</sup> all water utilities must aim to adequately meter and bill all large water consumers, including industrial, municipal, commercial, and government buildings. Moreover, it is required that all fire hydrants and secondary fire connections at the aforementioned properties should be metered, in order to prevent water being used for alternative

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<sup>1023</sup> See generally Vermersch *et al Guidance notes on apparent losses and water loss reduction planning*; Drakenstein Municipality *Water Management and Loss Control Policy* 2018 6.

<sup>1024</sup> See para 3.3.2 below.

<sup>1025</sup> Drakenstein Municipality *Water Management and Loss Control Policy* 2018 6.

<sup>1026</sup> Drakenstein Municipality *Water Management and Loss Control Policy* 2018 6.

<sup>1027</sup> Drakenstein Municipality *Water Management and Loss Control Policy* 2018 6.

<sup>1028</sup> Drakenstein Municipality *Water Management and Loss Control Policy* 2018 6.

<sup>1029</sup> See generally American Water Works Association *Water Audits and Loss Control Programs*; and Ncube and Taigbenu 2019 *Water SA* 174.

<sup>1030</sup> Ncube and Taigbenu 2019 *Water SA* 174.

<sup>1031</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses)* 2012 3.

reasons through fire connections.<sup>1032</sup> The report also underlines the importance of ensuring that all residential customers' water connections are metered and billed.<sup>1033</sup>

However, a peculiar problem is the occurrence of meter under-registration. Under normal circumstances, from a municipality's perspective, leaks that occur on a consumer's property form part of consumption and not water loss.<sup>1034</sup> Since on-site leakage typically occurs at a meagre flow rate, the water loss is under-registered by the meter.<sup>1035</sup> Consequently, meter under-registration, which occurs more frequently when meters age, contributes immensely to apparent losses.<sup>1036</sup>

In a study<sup>1037</sup> on meter under-registration, both the incidence and flow-rates of leaks occurring on-site in suburban properties were Johannesburg, Mangaung, and Cape Town, and was compared to some of the results of alternative studies.<sup>1038</sup> According to the results, the incidence of on-site leakage differs significantly in South Africa and internationally.<sup>1039</sup> The study shows that on-site leaks occurred on 17%, 28%, and 67% of high and middle-income properties in the City of Cape Town, Mangaung, and Johannesburg correspondingly.<sup>1040</sup> Notably, low-income areas indicated the highest occurrence of on-site leakage.<sup>1041</sup>

From the above, one may discern that large amounts of apparent water losses may occur due to meter under-registration. The latter is supported by the correlation between meter under-registration and the age of the meter.<sup>1042</sup> Given that most meters are on average replaced every 20 years in South Africa, it is fair to conclude that meter under-registration

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<sup>1032</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 3.

<sup>1033</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 3.

<sup>1034</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iv.

<sup>1035</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iv.

<sup>1036</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iii.

<sup>1037</sup> See generally Water Research Commission *Apparent Losses in Selected Areas in South Africa*.

<sup>1038</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iv.

<sup>1039</sup> See generally Water Research Commission *Apparent Losses in Selected Areas in South Africa*.

<sup>1040</sup> See generally Water Research Commission *Apparent Losses in Selected Areas in South Africa*; Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iv.

<sup>1041</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* iv.

<sup>1042</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* v – vi.

forms a key part of apparent water losses in cities with hundreds of thousands, if not millions, of water meter connections.<sup>1043</sup>

According to the 2012 report on non-revenue water in South Africa, the percentage of commercial or apparent losses varies greatly from municipality to municipality.<sup>1044</sup> This may likely be due to, for instance, the age differential of water-related infrastructure between municipalities, the number of registered meters, and the various policies concerning meter replacement adopted by each municipality. Hence, while some municipalities may report a mere 5% commercial water loss, others could well be as high as 80%.<sup>1045</sup> For instance, of the City of Johannesburg's reported 38.6% non-revenue water for the 2018/2019 year, 7% thereof are apparent losses,<sup>1046</sup> while the City of Cape Town reports 9.29% apparent losses as part of its non-revenue water for the 2016/2017 year.<sup>1047</sup>

Apparent water losses reflect directly as a major monetary loss for any city. Even though apparent losses form the second largest part of non-revenue water, after physical losses, this category of non-revenue water remains mainly within the municipality's control. It is, therefore, necessary for cities to focus on reducing apparent losses, by addressing, for instance, metering errors, such as incorrect billing. Hence, with adequate administrative and technical oversight and control, losses could be curbed to a great extent.

### *3.3.1.3 Unbilled authorised consumption*

Unbilled authorised consumption may entail either metered or unmetered items, including the flushing of sewers and mains, watering of municipal gardens, firefighting, street cleaning, public fountains, building water, and water used for frost protection.<sup>1048</sup> The latter is generally not considered as water losses and strictly form part of non-revenue

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<sup>1043</sup> Couvelis and Van Zyl *Apparent Water Losses Related to Municipal Metering in South Africa* v – vi.

<sup>1044</sup> McKenzie, Siquelaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* vi.

<sup>1045</sup> McKenzie, Siquelaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)* vi.

<sup>1046</sup> Johannesburg Water *Integrated Annual Report 2018/2019* 48.

<sup>1047</sup> City of Cape Town *Integrated Annual Report 2016/2017* 254.

<sup>1048</sup> Vermersch *et al Guidance notes on apparent losses and water loss reduction planning* 10.

water.<sup>1049</sup> The volume of water used in this category is often subject to optimisation and presents an opportunity for municipalities to save water.<sup>1050</sup>

Unbilled authorised consumption may be classified into two categories. Firstly, water used for either field operation or servicing.<sup>1051</sup> Secondly, water that is provided free of charge to certain consumers or categories of customers.<sup>1052</sup> For instance, water supplied to religious or administrative premises or the municipality's employees.<sup>1053</sup> While the second category of water might be provided based on habit, customs, or legal provisions, it must at all times be both listed and quantified by the responsible municipality. One critical aspect of apparent losses is illegal water use, which could be perceived as presenting separate and evermore complicated challenges to cities.

### **3.3.2 Illegal water use**

Illegal or unauthorised water connections are a serious and detrimental problem in most, if not all, South African municipalities. The severity of illegal water use extends directly to the operation of a municipality's water provision system if too many illegal connections are established in one area.<sup>1054</sup> Some municipalities report unaccounted for water rates as high as 50 -70%, which in all likelihood are primarily resultant from illegal water use.<sup>1055</sup> Elevated rates of illegal water use entail massive financial consequences for local municipalities, since water, purified and treated at substantial costs to taxpayers, is lost.<sup>1056</sup> Illegal water use originating from unauthorised water connections forms part of non-revenue water, but due to the severity of the issue, and the lack of explicit attention the issue receives in current water legislation,<sup>1057</sup> it is explored separately in this study.<sup>1058</sup>

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<sup>1049</sup> Vermersch *et al* *Guidance notes on apparent losses and water loss reduction planning* 10 – 11.

<sup>1050</sup> Vermersch *et al* *Guidance notes on apparent losses and water loss reduction planning* 10 – 11.

<sup>1051</sup> Vermersch *et al* *Guidance notes on apparent losses and water loss reduction planning* 13.

<sup>1052</sup> Vermersch *et al* *Guidance notes on apparent losses and water loss reduction planning* 13.

<sup>1053</sup> Vermersch *et al* *Guidance notes on apparent losses and water loss reduction planning* 14.

<sup>1054</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 7.

<sup>1055</sup> Malzbender *et al* "Traditional Water Governance and South Africa's "National Water Act" – Tension or Cooperation?" 18.

<sup>1056</sup> Malzbender *et al* "Traditional Water Governance and South Africa's "National Water Act" – Tension or Cooperation?" 18.

<sup>1057</sup> See paras 4.4.2 and 6.4.4.2 below.

<sup>1058</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 7.

Water theft via illegal water connections may occur during several points in the provisioning system, but for the most part, it is stolen from either a customer supply point or fire hydrants.<sup>1059</sup> For instance, it is not uncommon for water users to tamper with meters by placing a magnet close to the register magnets, which cause interference with the correct rotation of the register and results in lower meter readings.<sup>1060</sup> Fire hydrants, on the other hand, are often abused by various persons, such as street cleaners, construction workers, taxi drivers washing their vehicles, and many others who use the water for bathing or drinking.<sup>1061</sup> While blatant water theft is menacingly prevalent in South African cities, the situation is worsened by some water accounts going unnoticed and unbilled.<sup>1062</sup> For example, a temporary feed may be established at a construction site, which over time, becomes a permanent point of supply, but remains unmetered, unbilled, and is never included in the municipality's billing database.<sup>1063</sup>

As mentioned above, several reasons may exist for water users to establish an illegal water connection.<sup>1064</sup> Some reports indicate that where indigent persons are allocated with a certain amount of free water per month, the water is exhausted due to leaks in the water management devices.<sup>1065</sup> Hence, indigent consumers are sometimes left without adequate provision of water. Due to the often slow response times of municipal contractors, users resort to establishing illegal water connections.<sup>1066</sup> In some instances, persons can simply not afford the services offered by the municipality and commit water theft due to their economic inability to access water services.<sup>1067</sup>

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<sup>1059</sup> Seago, Bhagwan and McKenzie 2004 *Water SA* 31.

<sup>1060</sup> Seago, Bhagwan and McKenzie 2004 *Water SA* 31.

<sup>1061</sup> Seago, Bhagwan and McKenzie 2004 *Water SA* 31.

<sup>1062</sup> Seago, Bhagwan and McKenzie 2004 *Water SA* 31.

<sup>1063</sup> Seago, Bhagwan and McKenzie 2004 *Water SA* 31.

<sup>1064</sup> See para 1.3.2 above.

<sup>1065</sup> Water Online 2017 <http://www.waterafrica.co.za/index.php/news-events/news/96-illegal-water-connections#:~:text=Ill%2Dfitted%20water%20management%20devices,connections%20to%20ensure%20water%20access.&text=Residents%20can%20also%20now%20report,Centre%20on%3A%200860%20103%20089>.

<sup>1066</sup> Water Online 2017 <http://www.waterafrica.co.za/index.php/news-events/news/96-illegal-water-connections#:~:text=Ill%2Dfitted%20water%20management%20devices,connections%20to%20ensure%20water%20access.&text=Residents%20can%20also%20now%20report,Centre%20on%3A%200860%20103%20089>.

<sup>1067</sup> Mokgobu *Challenges of the Repairs and Maintenance of Water Infrastructure in Aganang Municipality in the Province of Limpopo* 7.

Unfortunately, whatever the reasons for the illegal actions of water users, it often results in water provision interruptions, which affects entire communities. As Mokgobu points out in an example, the situation that regularly ensues in the Aganang Municipality in Limpopo is the damaging of water infrastructure by breakages, vandalism, illegal connections, and blockages, which detrimentally affects water end-users in terms of setbacks caused by supply interruptions, or the cost of repairs.<sup>1068</sup> The author further postulates that although communities are often the best indicators concerning the quality of service delivery, cooperation between the city and its communities could render challenges faced regarding the maintenance and repair of water infrastructure an issue of the past.<sup>1069</sup> As may be gathered from the previous discussions concerning water service-related issues, the solution goes beyond improved communication. Not only are some of the issues municipalities face (such as illegal water use) enormously complex, but they are sometimes hard to detect, costly and complicated to repair, and may be of a magnitude beyond a municipality's immediate financial resources and capacity.<sup>1070</sup>

In 2010, the eThekweni Metropolitan Municipality faced the complicated task of providing over 400 informal settlements in their municipal areas with proper water and sanitation.<sup>1071</sup> The persons living in these settlements represent the urban poor of the city and suffer from poor water and sanitation conditions.<sup>1072</sup> Hence, the prevalence of illegal water connections, as an often desperate outcome, was not unsurprising. Upon establishing community ablution blocks, the city continued to formalise illegal connections instead of removing them, by installing water meters and reducing the water wastage through proper repairs.<sup>1073</sup> By adopting two similar water provision pilot projects, the Mbombela Local Municipality managed to uncover and remove illegal connections, while

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<sup>1068</sup> Mokgobu *Challenges of the Repairs and Maintenance of Water Infrastructure in Aganang Municipality in the Province of Limpopo* 13.

<sup>1069</sup> Mokgobu *Challenges of the Repairs and Maintenance of Water Infrastructure in Aganang Municipality in the Province of Limpopo* 13.

<sup>1070</sup> See para 3.3.1 above.

<sup>1071</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 15.

<sup>1072</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 15.

<sup>1073</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 15.

repairing household leaks as well.<sup>1074</sup> The projects entailed the massive reduction of water wastage and resulted in water savings of 30 000 kilolitres per month in the Matsulu area.<sup>1075</sup>

In general, cities seem to be cognisant of the severe implications of illegal water use. For instance, the City of Tshwane has both a formal policy and strategy concerning the removal of illegal water connections.<sup>1076</sup> In 2012, it was reported that between 13 000 to 21 000 illegal or unauthorised water connections existed in the city. Although the municipality removes illegal water connections on an ad hoc basis, it lacks the capacity to address the problem throughout the entire metropolitan area thoroughly.<sup>1077</sup>

Although illegal water connections and water theft constitute significantly to non-revenue water in South Africa, and globally, there is scant research on the topic. Moreover, some cities have online portals and information in place that advise persons to report illegal water connections,<sup>1078</sup> but there seems to be a lack of knowledge dissemination concerning what water theft, illegal water use, and illegal connections entail. Furthermore, while cities seem to be aware of the effect of illegal water use on resources, consumers, and water volumes, one may argue that they do not fully understand the extent of the problem. This may well be due to a lack of data and information regarding the issue, especially considering the unlawful nature of the problem at hand, which makes gathering data all the more difficult.

### **3.3.3 Insufficient data**

Cities, as highly complex systems, with their domains becoming increasingly interconnected and their processes exceedingly dynamic, will progressively require

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<sup>1074</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 15.

<sup>1075</sup> Water Information Network South Africa *Good Practice in Municipal Water Conservation and Water Demand Management: Financial, Institutional and Behavioural Interventions* 15.

<sup>1076</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 7.

<sup>1077</sup> City of Tshwane *Mechanisms to Reduce Non-Revenue Water (Commercial Losses) 2012* 7.

<sup>1078</sup> See for instance eThekweni Metropolitan Municipality 2020 [http://www.durban.gov.za/Resource\\_Centre/new2/Pages/Report-Water-Leaks-and-Illegal-Water-Connections-.aspx#:~:text=Many%20of%20our%20customers%20have,131%203013%2C%20at%20their%20expense.](http://www.durban.gov.za/Resource_Centre/new2/Pages/Report-Water-Leaks-and-Illegal-Water-Connections-.aspx#:~:text=Many%20of%20our%20customers%20have,131%203013%2C%20at%20their%20expense.)



sophisticated data to realise their ability to respond adequately to the challenges of service delivery, especially in the age of sustainability and urbanisation.<sup>1079</sup> Data are essential not only for the technological opportunities it presents, such as big data analytics and context-aware computing,<sup>1080</sup> but also for the prospect of increased knowledge. Data allows cities to understand where they fail and succeed in terms of service delivery, determining where inequalities persist, and for adequate and informed decision-making, amongst many other advantages.<sup>1081</sup> As the saying goes, what gets measured, gets managed; conversely, what does not get measured, does not get managed effectively.<sup>1082</sup>

Nevertheless, not everything that "gets measured" has value. Data needs to be of good quality and should have integrity in order to be valuable.<sup>1083</sup> While there is no universal agreement, data quality generally has six dimensions, namely completeness,<sup>1084</sup> uniqueness,<sup>1085</sup> timeliness,<sup>1086</sup> validity,<sup>1087</sup> accuracy<sup>1088</sup> and consistency.<sup>1089</sup> Data integrity is known as an uncompromising adherence to certain ethical values, complete avoidance of deception, and strict honesty, as well as the state of being complete and whole, or entirely

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<sup>1079</sup> Bibri *Smart Sustainable Cities of the Future* 24.

<sup>1080</sup> Bibri *Smart Sustainable Cities of the Future* 24.

<sup>1081</sup> Thakuria, Tilahun and Zellner *Seeing Cities Through Big Data* 3.

<sup>1082</sup> See Water Online 2019 <http://www.waterafrica.co.za/index.php/news-events/news/447-data-driven-decision-making-for-water-security>.

<sup>1083</sup> See generally DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions*; and National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age*.

<sup>1084</sup> "Completeness" can be defined as the portion of stored data measured against the potential of being 100% complete; see DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 8.

<sup>1085</sup> "Uniqueness" involves that no one thing will be recorded more than once based on how it is identified; see DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 9.

<sup>1086</sup> "Timeliness" is described as the degree to which data represents reality from a required point in time; see DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 10.

<sup>1087</sup> "Data are valid if it conforms to the syntax (format, type, range) of its definition." See DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 11.

<sup>1088</sup> "Accuracy" entails the extent to which data correctly describes the real world thing or event that is being described; see DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 12.

<sup>1089</sup> Data "consistency" entails the "The absence of difference, when comparing two or more representations of a thing against a definition." See DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions* 13.

unimpaired.<sup>1090</sup> Thus, to be convinced of the integrity of data, one needs to be confident that it is complete, unaltered, and verified.<sup>1091</sup> Considering these requirements in the ensuing discussion will be necessary to accurately determine whether cities have sufficient data regarding their water supply and services.

The availability of data concerning water supply and use in the country is especially prudent. According to the DWS's Master Plan<sup>1092</sup> –

Reliable data, information and knowledge on the status of the country's water resources, water supply and sanitation is required to understand and enable spatial and non-spatial analysis and presentation of water use and water demand including the manner in which various economic, social and environmental activities in catchments affect (consume, pollute, increase) or constrain (limit, degrade) water quality, quantity and ecosystems.

It is further held that effective data and information management is integral for the successful regulation and provision of water services and resources.<sup>1093</sup> The availability of information, as permitted by the recording of data, allows for the initiation of interventions or actions, understanding water usage trends, planning efficiently for the future, and adapting current management plans fittingly.<sup>1094</sup> The *Master Plan* firmly states that inadequate data and information caused by weak monitoring infrastructure and systems pose significant risks to both planning and decision-making and should be addressed with great urgency through "the formalisation of an effective national hydrological monitoring centre".<sup>1095</sup> The latter urgency is, arguably, driven by the fact that the lack of data or information resulting from information systems that are not maintained or outdated, or from weak monitoring systems, pose a great risk to attaining the goals put forward in South Africa's water legislation, policies, and strategies.

The DWS, with due consideration to how critical adequate data and information are for the effective management of water resources and services, initiated the development of

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<sup>1090</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 25.

<sup>1091</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 26.

<sup>1092</sup> Volume 1 of the *Master Plan* 43.

<sup>1093</sup> Volume 1 of the *Master Plan* 44.

<sup>1094</sup> Volume 1 of the *Master Plan* 44.

<sup>1095</sup> Volume 1 of the *Master Plan* 43.

the National Integrated Water Information System (hereafter NIWIS).<sup>1096</sup> The latter system is an integrator of current DWS information systems and programmes, aimed at providing data to sector decision-makers.<sup>1097</sup> The NIWIS provides information products via "dashboards" to facilitate efficient reporting and analysis throughout the country's water value chain.<sup>1098</sup>

The water services section on the NIWIS provides dashboards for access to water, water supply reliability, non-revenue water, water services development plans, and water services products. The first dashboard on access to water provides data from April 2020 on "access to water infrastructure delivered".<sup>1099</sup> As per the information page on this dashboard, admittedly, access to water in this instance is measured only by the percentage of the population and households that have been provided with access to basic water supply infrastructure. Notably, a key assumption indicated on this dashboard is that the information represents households or water users that have been given access to, at the minimum, RDP level water supply, and no information or consideration of scheme functionality (thus, whether or not the scheme is still completely functional with no interruptions) is offered. As will be discussed below,<sup>1100</sup> disregard for the sustainability of water service delivery is a major challenge in South African cities. Arguably, the proper management of water scheme functionality should include the monitoring thereof, which could provide immensely valuable data for cities to explore.<sup>1101</sup>

Whether or not the water infrastructure provided to persons is still in working order is addressed by another section on the NIWIS, namely the "water supply reliability" dashboard,<sup>1102</sup> but it is also not without some issues. This dashboard aims to provide data on the functional access to basic water supply infrastructure, yet is only updated once a year in April.<sup>1103</sup> Since the data is updated yearly, and no continuous monitoring system is in place, it is conceded that it does not provide an accurate depiction of the state of

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<sup>1096</sup> See the DWS 2020 <http://www.dwa.gov.za/niwis2/>; Volume 1 of the *Master Plan 43*.

<sup>1097</sup> Volume 1 of the *Master Plan 43*.

<sup>1098</sup> DWS 2020 <http://www.dwa.gov.za/niwis2/>.

<sup>1099</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/AccessToWaterID>.

<sup>1100</sup> See para 3.3.4 below.

<sup>1101</sup> See para 3.3.4 below.

<sup>1102</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/WaterSupplyReliability>.

<sup>1103</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/WaterSupplyReliability>.

functional water supply in the country. The dashboard does indicate that NIWIS may at any time request updated information,<sup>1104</sup> but this information is nonetheless not immediately made publicly available.

Given that the above data is mainly sourced by national means (e.g., Statistics South Africa censuses and General Household Surveys),<sup>1105</sup> it is conceivable that an opportunity exists for local governments to do more in terms of gathering up to date and accurate data regarding especially, water use and losses. This includes keeping accurate and up to date municipal records and utilising innovative means to collect the relevant data, such as continuous monitoring systems. The latter could allow for a more accurate national depiction of water provision in the country and may go a long way in assisting water conservation and demand management efforts.

Requiring local governments to provide data as to the water services they provide is not a new phenomenon, as indicated by the National Water Services Knowledge System (hereafter the NWSKS).<sup>1106</sup> The NWSKS hosts national, provincial and local level information concerning a variety of themes, such as demography, access to basic services (based on access to water infrastructure), water services programmes, water quality management, institutional effectiveness, water conservation and demand management, finances, protest hotspots, census results, and water board related data.<sup>1107</sup> Although the aforementioned presents itself as an impressive feat, by analysing the information on the NWSKS and relaying it back to what is provided on the NIWIS, some serious issues come to light, as will be discussed below. Furthermore, it affirms the fact that local governments across South Africa have a serious challenge to overcome because they have insufficient data pertaining to the water services they provide.<sup>1108</sup>

Insufficient data does not only relate to a complete lack of data, but also refers to issues such as inaccurate data and data lacking timeliness. As mentioned above, the accuracy

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<sup>1104</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/WaterSupplyReliability>.

<sup>1105</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/>.

<sup>1106</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1107</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1108</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/>.

and timeliness of data is an essential dimension of data quality,<sup>1109</sup> and data that are not current may be viewed as outdated and inaccurate. By employing the NWSKS on a random basis to provide data at a local level on the City of Matlosana in the North-West province, the information provided on the themes is immensely inconsistent regarding specifically the date on which the data or information were recorded.<sup>1110</sup> In this instance, the only data provided from the current year, 2020, are that on the water quality management in this municipality.<sup>1111</sup> Themes such as water board related information and water demand management date back as far as 2014 and 2011/2012 respectively.<sup>1112</sup>

The latter-mentioned date pertaining to water demand management is especially troubling. This theme sets out information on the state of non-revenue water and water losses.<sup>1113</sup> As per the NWSKS, information on municipal non-revenue water and water losses are founded on "municipal inputs where available and DWS estimates where not available."<sup>1114</sup> The last nation-wide investigation into non-revenue water was conducted in 2012 by McKenzie, Siquilaba and Wegelin,<sup>1115</sup> which coincides with the date of the data utilised on the NWSKS.

Hence, firstly, as per the NWSKS at least, current nation-wide estimates as to non-revenue water is still based on ancient data and firmly underscores the fact that cities are potentially making decisions and managing water resources founded on outdated and insufficient data. Secondly, the NWSKS acknowledges using DWS "estimates" for providing the data concerning non-revenue water, yet does not provide the source of this data.<sup>1116</sup> The accuracy of these estimates, and thus the *integrity* of the entire database, is questionable.

Thirdly, although the NIWIS explicitly states that data from the NWSKS is used, this database recently updated the information on non-revenue water and indicates that the

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<sup>1109</sup> See DAMA UK Working Group *The six primary dimensions for data quality assessment: defining data quality dimensions 7*.

<sup>1110</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1111</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1112</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1113</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1114</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1115</sup> McKenzie, Siquilaba, and Wegelin *State of Non-Revenue Water in South Africa (2012)*.

<sup>1116</sup> NWSKS 2020 <http://ws.dwa.gov.za/wsk/>.

latest update is from the 1<sup>st</sup> of January 2020.<sup>1117</sup> This is inconsistent with the information on the NWSKS as discussed above and indicates that the data on the NIWIS must have been sourced from elsewhere, because it makes available additional statistics on non-revenue water for each year from 2016 until 2020. Again, the integrity of these statistics are disputable, given that the values they are based on are *exactly* the same for this 5-year period,<sup>1118</sup> and each year's non-revenue water rate is, reportedly, 36%.

This information, furthermore, offers no guarantee of reliability, since, as per the "Data used to generate the information" section on this site, it is provided that<sup>1119</sup> –

Where information is not available other sources of information such as the All Towns Studies is used and failing this default values are generated per municipal category. At any time about half of municipalities can provide information, but this equates to about 75% of water consumed.

From this, one may deduce that so-called default values are generated without providing the data that these values are based on. This once again relates back to the integrity of the data, and the fact that to verify the integrity of data, one requires the availability of "metadata". Metadata generally refers to the descriptions of the context, content and structure of certain information objects, such as research data, at any level of aggregation (e.g., a single data item, many data items, or entire databases).<sup>1120</sup> Even though data that are used to derive findings or information, draw conclusions, or build models may usually undergo various changes during processing, archiving, or distribution, it cannot be accurately interpreted or utilised lacking understanding of the processing undergone.<sup>1121</sup> Consequently, it is normally not possible to judge the integrity of data that have been processed without access to the metadata.<sup>1122</sup>

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<sup>1117</sup> NIWIS 2020 [http://www.dwa.gov.za/niwis2/ws\\_nrw](http://www.dwa.gov.za/niwis2/ws_nrw).

<sup>1118</sup> Each year's rate is reportedly based on the following values: non-revenue water: 1 049 322 847 Kl, billed unmetered consumption: 53 220 200 Kl, billed metered consumption: 1 966 546 Kl, and, ultimately, a 36% non-revenue water rate; see NIWIS 2020 [http://www.dwa.gov.za/niwis2/ws\\_nrw](http://www.dwa.gov.za/niwis2/ws_nrw).

<sup>1119</sup> See the "information" section at NIWIS 2020 [http://www.dwa.gov.za/niwis2/ws\\_nrw](http://www.dwa.gov.za/niwis2/ws_nrw).

<sup>1120</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 24.

<sup>1121</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 25.

<sup>1122</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 25.

While data estimation is not a questionable practice,<sup>1123</sup> it becomes problematic where no information or metadata is available concerning how these estimations were made or the data used to do so. In such instances, one must be wary of crossing the Rubicon into merely fabricating information or data. It is therefore that high standards of openness and transparency is necessary to ensure the integrity of data, and ultimately, the usability thereof.<sup>1124</sup>

The above deliberation is, worryingly, underscored by cautionary messages which are displayed on most of the dashboards on NIWIS regarding the data provided thereon. These cautions include that there is no express or implied warranty as to its accuracy, completeness or suitability.<sup>1125</sup> Without any certainty as to the quality or accuracy of data, it may be viewed as potentially unusable, especially insofar as the rendering of data into information via certain algorithms is concerned. Insufficient data in terms of quality and accuracy may lead to a variety of issues upon its implementation, such as wider margins of error, unusable machine learning tools,<sup>1126</sup> and may even lead to many types of bias upon the use of such data for Artificial Intelligence (hereafter, AI) algorithms.<sup>1127</sup> This leads one to question the ultimate practicality of the database, particularly when the computer science concept of "garbage in garbage out" (hereafter GIGO) is given thought. This concept expresses the idea that in computing and many other spheres, data that is incorrect or of poor quality will always render faulty output.<sup>1128</sup>

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<sup>1123</sup> Data estimation is an accepted statistical practice; see PennState Elberly College of Science 2018 <https://online.stat.psu.edu/stat504/node/16/>.

<sup>1124</sup> National Academy of Sciences *Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age* 3.

<sup>1125</sup> NIWIS 2020 <http://www.dwa.gov.za/niwis2/AccessToWaterID>.

<sup>1126</sup> Machine learning is the process whereby systems learn from data, such as training a system to make certain decisions based on the data it is provided with. In so doing, the system updates its learning, and hopefully develops improved decision-making abilities as it is provided with more data. See Redman 2018 <https://hbr.org/2018/04/if-your-data-is-bad-your-machine-learning-tools-are-useless>.

<sup>1127</sup> Bias is known as unfair preference, and entails the systematic discrimination against particular groups or individuals based on certain inappropriately used traits or characteristics, such as race, gender, and sexual orientation. Bias in AI occurs from the data that is fed to the algorithm involved. Bias in this regard may be either intentional or unintentional, and is often unpredictable. See Silberg and Manyika 2019 *McKinsey Global Institute* 1 – 8; Williams, Brooks and Shmargad 2018 *Journal of Information Policy* 78 – 115.

<sup>1128</sup> Oxford Reference 2020 <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095842747#>.

The above begs the question of whether cities are tentatively tending to their duty to make available information on the water services they provide. As mentioned previously, a water services institution is required to measure the amount of water provided to each supply zone within its supply area and determine the quantity of unaccounted for water.<sup>1129</sup> A water services institution is then expected to take steps to reduce the amount of unaccounted-for water.<sup>1130</sup> Given, for instance, the apparent out-dated data as to non-revenue water, it is questionable whether local governments are in fact adequately measuring this issue. If they are, it is then disputable whether the problem lies with properly reporting thereon, lack of data provision and collection standards, or lack of training on proper data collection.

Based on this discussion, a case could be made for reinforcing the duty of cities to provide up to date, accurate and good quality data. This may be reasonably expected from cities, given their function to provide adequate water services provision to their communities. As pointed out by Volume 2 of the *Master Plan*, a lack of continuous monitoring and analyses of water provision data exists, is particularly troubling when measuring the progress made with the implementation of water conservation and demand management efforts.<sup>1131</sup> In other words, if cities are reluctant or unable to provide accurate data pertaining to water use and losses, they cannot with certainty create or implement water conservation and demand management strategies or efforts, or accurately measure efforts already in place. Hence, the possibility persists that such efforts may be or remain vague and ineffective, since a targeted approach cannot be followed.

The *NWRS* indicates that both the collection and monitoring of data in the water sector will have an effect on the accuracy of water resource status assessments, as well as subsequently determining the extent of the country's water problems.<sup>1132</sup> Proper data collection and monitoring are said to be capable of vastly improving planning and policy

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<sup>1129</sup> See para 2.5.1.2 above; Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1130</sup> See para 2.5.1.2 above; Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1131</sup> Volume 2 of the *Master Plan* 3 – 25.

<sup>1132</sup> The *NWRS* iv.



formulation processes.<sup>1133</sup> The *NWRS* was adopted in 2013, yet based on the foregoing discussion, it is debatable whether any real progress has been made in this regard and whether the true extent of the country's water problems is actually being measured.

Whichever way it is approached, one may conclude that cities indeed face the challenge of insufficient data concerning the water services they provide. Moreover, since data and information is being provided on so many different platforms (with some not discussed here for the sake of conciseness),<sup>1134</sup> it is no wonder that inconsistencies occur. This fragmented approach to reporting on water service delivery is, thus, part of the larger problem.

The insufficiency of data, unfortunately, is not an isolated issue, since poor data affects most, if not all, actions taken by cities in the course of fulfilling their mandates. This includes planning and decision-making, to budgeting and allocation of funds and capacity.<sup>1135</sup> The issue of data also plays into the next challenge discussed below, namely the sustainability of water service delivery, since the proper maintenance and operation of water infrastructure necessitates an accurate depiction of its current state, management, and performance, amongst other factors.<sup>1136</sup> Failing such, water infrastructure may fall into disrepair, since cities underestimate what will be required to sustainably manage said infrastructure.<sup>1137</sup>

### ***3.3.4 The sustainability of water service delivery***

Traditionally, the so-called international development approach to service delivery in the water sectors of developing economies has been planned and executed according to a project-by-project method.<sup>1138</sup> This regularly results in the provision of water infrastructure in one previously deficient area, and swiftly moving on to another, to

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<sup>1133</sup> The *NWRS* iv.

<sup>1134</sup> For more information systems, see the DWS 2020 <http://ws.dwa.gov.za/wsmenu/#:~:text=The%20National%20Water%20Services%20Knowledge,Projects%20and%20Free%20Basic%20Services>.

<sup>1135</sup> The *Master Plan* 44.

<sup>1136</sup> Rural Water Supply Network *Myths of the Rural Water Supply Sector, Perspectives No 4 3*.

<sup>1137</sup> Rural Water Supply Network *Myths of the Rural Water Supply Sector, Perspectives No 4 3*.

<sup>1138</sup> Allen and Lemme 2016 *American Water Works Association* 46.

progress towards the goal of providing access to water to all persons.<sup>1139</sup> However, this approach rarely involves strategies concerning reaching full coverage in any one area.<sup>1140</sup> Moreover, without the required training, support, and ongoing resources to maintain and operate the relevant infrastructure efficiently, many new water systems quickly fall into disrepair.<sup>1141</sup> Commonly, water service providers record the apparent improvement in water service delivery in that area, yet, do not, in future, account for the failure of these systems, leaving persons without access to water once more.

Accordingly, Singh, in harmony with the WHO and UNICEF, argues that although a figure of 748 million persons globally is reported as still lacking access to improved water services, the true scale of the problem is vastly underestimated.<sup>1142</sup> Critical factors such as the distance to facilities, drinking water quality, and the continuous availability of improved services are not yet measured.<sup>1143</sup> Hence, facilities that have been recorded as "improved drinking water sources" may, in reality, provide water of poor quality, unreliably, and infrequently. It is also conceded that often, progressive figures documented lack veracity.<sup>1144</sup> This is so, since they may fail to consider the number of water facilities that have broken, deteriorated, and are ultimately in a state of dilapidation, primarily due to a deficiency of adequate and continuous maintenance.<sup>1145</sup>

It is with the above context in mind that the sustainability of water service delivery is understood in this section. When the South African government committed itself to the *2030 Agenda for Sustainable Development*, they agreed to ensure the availability and sustainable management of water and sanitation for everyone.<sup>1146</sup> The 2003 *Strategic Framework for Water Services* (hereafter, SFWS) already indicated that access to both taps and toilets is of no use if the infrastructure breaks or malfunctions, and access to

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<sup>1139</sup> See SDG 6 of the *2030 Agenda for Sustainable Development* (2015).

<sup>1140</sup> Allen and Lemme 2016 *American Water Works Association* 46.

<sup>1141</sup> Allen and Lemme 2016 *American Water Works Association* 46.

<sup>1142</sup> Singh *The Human Right to Water: From Concept to Reality* 6; see generally WHO and UNICEF *Progress on Drinking Water and Sanitation: 2014 Update*.

<sup>1143</sup> Singh *The Human Right to Water: From Concept to Reality* 6; see generally WHO and UNICEF *Progress on Drinking Water and Sanitation: 2014 Update*.

<sup>1144</sup> Singh *The Human Right to Water: From Concept to Reality* 6.

<sup>1145</sup> Singh *The Human Right to Water: From Concept to Reality* 6.

<sup>1146</sup> See SDG 6 of the *2030 Agenda for Sustainable Development* (2015); UNICEF and the UNDP-SIWI *Water Governance Facility Programming for Sustainability in Water Services – A Framework* 9.

water ceases.<sup>1147</sup> The framework acknowledges that sustainability is necessary for the right to sufficient access to water to be realised, and further indicates that sustainability also requires services to be affordable.<sup>1148</sup>

Within the water sector, the renewed focus on sustainability is a welcome and necessary development, given the frequency with which new water and sanitation services break down, and detrimentally affect the continuity of benefits to water users. According to the *General Household Survey* of 2018, an estimated 89% of households had access to water services, but the reliability rate of these services was at 64%.<sup>1149</sup> It is thus recognised that the capacity of water services authorities to manage existing infrastructure, as well as operate and maintain it, requires urgent attention.<sup>1150</sup>

Non-functionality rates, such as the above, are said to be an expression of both a fragmented and weak water service chain.<sup>1151</sup> The latter vulnerabilities primarily occur between the construction of the water provision point, and the subsequent management of the system, to the point at which consumption takes place.<sup>1152</sup> While the aforementioned weaknesses are substantial, challenges may be observed even further back in the process. For instance, the eventual failure of newly built water provision systems may be traced back to poor planning and siting, as well as the quality of the entire construction process.<sup>1153</sup> Additionally, studies indicate that poor or non-functionality within year one to five is chiefly observed due to poor water service management models, which do not consider the entire service delivery process.<sup>1154</sup>

What it all boils down to, is the myth that constructing new water supply systems is more important than keeping existing systems in operation. For cities that already run on

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<sup>1147</sup> *Strategic Framework for Water Services* 2003 ii.

<sup>1148</sup> See the SFWS 2003 ii.

<sup>1149</sup> See Statistics South Africa *General Household Survey 2018*; Volume 2 of the *Master Plan 1 – 6*.

<sup>1150</sup> Volume 2 of the *Master Plan 1 – 6*.

<sup>1151</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 9.

<sup>1152</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 9.

<sup>1153</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 9.

<sup>1154</sup> UNDP-SIWI Water Governance Facility *Programming for Sustainability in Water Services – A Framework* 9.

financial constraints, this entails a crisis of wasted infrastructure investment.<sup>1155</sup> The possibility stands that cities continue to underestimate the resources required to keep new systems operational.<sup>1156</sup> Hence, due to a lack of, or poor maintenance, such systems fail before their estimated design lifetime is reached.<sup>1157</sup>

The most common definition associated with sustainability is that of the Brundtland Report, which defines sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs.<sup>1158</sup> Sustainability within the service delivery milieu, however, is described differently and has various definitions. For one, as per a 1994 definition, sustainability is known as the ability of a water and sanitation development project to either maintain or expand a flow of benefits at a certain level for an extensive time period after project inputs have stopped.<sup>1159</sup> Authors also refer to sustainable service delivery as "sustained service", and it is conceptualised as a service that frequently and reliably provides sufficient water of an acceptable quality, as observed by both water authorities and users, for at least domestic use.<sup>1160</sup> Sustained service also entails that the breakdown of infrastructure is rare and rapidly repaired within 48 hours, and financing from the local water authority covers, at the minimum, the regular costs of operation, repairs, and maintenance.

Conversely, Gross, Van Wijk and Mukherjee maintain that "effectively used service" may be defined as a combination of the proportion of households who have easy access to an improved water supply; those always utilising the improved water provision for drinking (at the least); and the environmentally conscious use of the water system, including the absence of stagnant water sources and the presence of proper drainage. Essentially, both the concepts of "effectively sustained service" and "effectively used service" relates back to what is expected in terms of the fulfilment of the right to water as per General Comment 15. Specifically, General Comment 15 necessitates that one has the right to

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<sup>1155</sup> Rural Water Supply Network *Myths of the Rural Water Supply Sector, Perspectives No 4 3.*

<sup>1156</sup> Rural Water Supply Network *Myths of the Rural Water Supply Sector, Perspectives No 4 3.*

<sup>1157</sup> Rural Water Supply Network *Myths of the Rural Water Supply Sector, Perspectives No 4 3.*

<sup>1158</sup> UN GA *Report of the World Commission on Environment and Development: Our Common Future (1987) A/42/427.*

<sup>1159</sup> IRC WASH *The Sustainability of Donor-Assisted Rural Water Supply Projects 5.*

<sup>1160</sup> See para 2.2.2 above.

maintain access to one's existing water supply and enjoy the right to water free from interference.<sup>1161</sup> Moreover, General Comment 15 provides for the right to a system of water supply and management that permits equality of opportunity for all persons to enjoy their right to water.<sup>1162</sup> It is further specified that the right to water entails the entitlement of everyone to sufficient, safe, acceptable, physically accessible, and affordable water for both personal and domestic uses.<sup>1163</sup>

Arguably, having sustainable or sustained access to water services necessitates the presence of the above content provided for by General Comment 15, echoed by the *WSA*<sup>1164</sup> which concretises the constitutional water right. As indicated earlier in this study, *WSA* sets out the duty on the state to provide water supply services in an efficient, equitable and sustainable manner.<sup>1165</sup> However, neither the *WSA* or the *NWA* provide clarity as to what is meant by "sustainability" within the South African water provision mandate. In 2008, the then Department of Water Affairs and Forestry<sup>1166</sup> held that sustainability, as it concerns sustainable water services, may be described as the vision of a community's future that is both community oriented and focused on long-term goals, while taking into consideration the linkages between economic, institutional, environmental, and social aspects of the community at large.

Based on the above deliberation on sustainable water service delivery, one may draw two conclusions. Firstly, all of the above definitions have the aspect of "continuity" firmly embedded in them. Consequently, when water provision is concerned, one may reasonably assume that the state should have "continuity" in mind, not only by conserving water for future generations, but also ensuring continuity in terms of older or newly built infrastructure and water delivery systems. This can be achieved by creating strategies and management plans which provide for the finances, resources and capacity to safeguard the continuity (or sustainability) of water service delivery. Secondly, sustainability within the South African water context involves various components, namely

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<sup>1161</sup> See para 2.3.1.11 above; Art 10 of General Comment 15.

<sup>1162</sup> See para 2.3.1.11 above; Art 10 of General Comment 15.

<sup>1163</sup> See para 2.3.1.11 above. Art 2 of General Comment 15.

<sup>1164</sup> See para 2.5.1.2 above.

<sup>1165</sup> See the Preamble to the *WSA*, see also para 2.5.1.2 above.

<sup>1166</sup> See generally Department of Water Affairs and Forestry *Fact Sheets for Water Sector (2008)*.

an institutional component (including enabling legislation, good governance, strategies and collaboration between spheres of government); an economic component (which entails proper enabling budgetary frameworks, the willingness to pay, and inter-governmental financial arrangements); a social/technical component (comprising of infrastructure integrity, proper planning and service provision, as well as total water management); and, finally, the environmental component (which predominantly involves water conservation strategies).<sup>1167</sup>

In terms of the aforementioned components, the social/technical and economic systems are embedded within the larger environmental ecosystem, while collectively, the components are integrated via an effective institutional governance system held together within proper regulatory frameworks.<sup>1168</sup> Sustainable water services are firmly vested within the institutional, economic and social/technical component, broadly overlapping with the environmental component, especially insofar as resource availability and water safety are concerned. The above is founded on the South African Cities Network's sustainability assessment in the 2011 *State of the Cities Report*,<sup>1169</sup> and was developed by Carden and Armitage in the authors' pursuit to develop a "Sustainability Index for Integrated Urban Water Management".<sup>1170</sup>

According to Carden and Armitage,<sup>1171</sup> tangible difficulties in sustaining water service provision over the long term persists in South African cities. Such difficulties arise from uncertainties regarding cities' ability to maintain funding levels in the water sector, and challenging and fragmented institutional capabilities.<sup>1172</sup> Even more, although water provision infrastructure in various urban areas is reaching replacement age, the necessary replacement and maintenance thereof are being hampered by factors such as a lack of or improper life-cycle asset planning, funding constraints, poorly designed systems, weak

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<sup>1167</sup> Carden and Armitage 2012 *Water SA* 347.

<sup>1168</sup> Carden and Armitage 2012 *Water SA* 347.

<sup>1169</sup> South African Cities Network *State of the Cities Report 2011 Towards resilient cities: A reflection on the first decade of a democratic and transformed local government in South Africa 2001-2010*.

<sup>1170</sup> Carden and Armitage 2012 *Water SA* 347.

<sup>1171</sup> Carden and Armitage 2012 *Water SA* 347.

<sup>1172</sup> Carden and Armitage 2012 *Water SA* 347.

maintenance and operating practices, and poor technical capacity.<sup>1173</sup> One may, therefore, postulate that the difficulties experienced by cities in sustaining water service delivery may, somewhat ironically, result in additional and extensive water service delivery challenges such as an increase in non-revenue water caused by inadequate infrastructure. The National Planning Commission's 2011 *Diagnostic Overview* report reaffirms the above, where it holds that South Africa has to be cautious about what and how it builds and what risks it pursues.<sup>1174</sup> This is so, since effective and sound institutions and leadership is necessary to provide proper guidance via policy and law to sustain the financing, delivery, and maintenance of new infrastructure, and prevent the wastage of already scarce capital.<sup>1175</sup>

### **3.4 Concluding remarks**

The objective of this chapter was to critically examine water service delivery in South African cities to determine certain challenges impeding progress to provide communities with access to sufficient water in fulfilment of the constitutional water right. The chapter commenced by generally discussing water service delivery in South Africa,<sup>1176</sup> following which it elaborated on the specific issues of non-revenue water, illegal water connections, insufficient data, and the sustainability of water service provision.<sup>1177</sup>

The challenges discussed above<sup>1178</sup> are, evidently, highly interrelated and interdependent on each other, and, therefore, all the more complicated. For instance, illegal water use and the sustainability of water services both have an effect on the amount of non-revenue water in cities.<sup>1179</sup> Insufficient data concerning the latter issues, including factors such as the status of operation of water infrastructure, in turn, affects planning, budgeting, resource allocation, the creation of maintenance plans, amongst other issues.<sup>1180</sup> Hence,

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<sup>1173</sup> See the National Planning Commission *Diagnostic Overview (2011a)* 17, 23; Carden and Armitage 2012 *Water SA* 347.

<sup>1174</sup> National Planning Commission *Diagnostic Overview (2011a)* 17.

<sup>1175</sup> National Planning Commission *Diagnostic Overview (2011a)* 17.

<sup>1176</sup> See para 3.2 above.

<sup>1177</sup> See paras 3.3.1 – 3.3.4 above.

<sup>1178</sup> See para 3.3 above.

<sup>1179</sup> See paras 3.3.1, 3.3.2 and 3.3.4 above.

<sup>1180</sup> See para 3.3.3 above.

for cities, addressing one of these challenges may, inevitably, entail having to address the others as well.

This could be strenuous on city resources. For cities to be able to address these challenges, they need to take steps to better understand each challenge, as well as the correlation between these challenges, and employ innovative solutions, such as technological developments.<sup>1181</sup> In the long run, for these solutions to be sustainable and improve over time, cities will be required to cooperate in the process of knowledge, experience and technology sharing. Nevertheless, based on the above deliberation, several findings may be proposed concerning these specific challenges.

From the limited available information, it is clear that non-revenue water is a significant problem for nearly *all* South African cities.<sup>1182</sup> One may deduce that perhaps the primary reason for this is ignorance as to the true scale of the problem.<sup>1183</sup> This is due to a lack of performing proper monitoring, a failure to provide accurate reports as well as making such reports *readily* available.<sup>1184</sup> Based on the preceding analysis of the quality and integrity of data in cities regarding factors such as non-revenue water, it is conceivable that many cities may be developing plans, strategies and budgets based on a potential misunderstanding or underestimation of non-revenue water.<sup>1185</sup> As such, the latter may be identified as a potential gap that warrants exploring.

Addressing the challenge of insufficient data is a complex feat, since the reporting and information provision framework regarding water service provision and water resources in South Africa is fragmented.<sup>1186</sup> There are various information systems available, and some seem to rely on each other, which leads to inconsistencies.<sup>1187</sup> The role of cities in providing information to these databases or information systems is ambiguous. What is clear is that at the city-level, several monitoring and reporting issues exist. This can be deduced from various sets of incomplete and outdated data, as well as information

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<sup>1181</sup> NDP 33.

<sup>1182</sup> See para 3.3.1, 3.3.1.1 – 3.3.1.3 above.

<sup>1183</sup> See para 3.3.1 and 3.3.3 above.

<sup>1184</sup> See para 3.3.1, 3.3.1.1 – 3.3.1.3, and 3.3.3 above.

<sup>1185</sup> See para 3.3.3 above.

<sup>1186</sup> See para 3.3.3 above.

<sup>1187</sup> See para 3.3.3 above.



systems that lack quality and integrity.<sup>1188</sup> The NIWIS and NWSKS acknowledge that cities often lack data and that these databases rely on estimates without providing metadata.<sup>1189</sup> This raises questions as to the integrity of this data and the ultimate usefulness of such data in terms of relying thereon to improve decision-making, planning and policy.<sup>1190</sup>

Next, in terms of the sustainability of water service provision, cities need to focus on improving siting, planning, procuring good quality infrastructure, creating maintenance plans, and adequately allocate both financial and human resources to ensure the sustainability of their water services.<sup>1191</sup> Cities need to develop an understanding of what "sustainability" within their own unique context entails.<sup>1192</sup> Communities are essential for understanding sustainability in this instance, and cities need to approach communities to determine their needs and thoughts. Cities should also, for instance, consider the population of communities, their historical relationship with access to water, and the portion of vulnerable persons that the community consists of. External factors such as the distance persons have to travel to access water, the quality of the water, and the continuity of water provision are all essential considerations as far as planning for sustainable water service provision is concerned.<sup>1193</sup>

Evidently, the challenge of developing an understanding as to what the concept of sustainability within cities' unique context entails is complex. Yet, in doing so, cities will be able to plan for, set clear targets, and develop strategies for sustainable service delivery. This will further allow cities to monitor programmes aimed at sustainability, and adapt to any potential issues by identifying iterative response strategies and providing feedback to sector leaders on programmes.

The next chapter aims to identify the law and policy, bylaws, strategies and plans relevant to non-revenue water, illegal water use, insufficient data, and the sustainability of water resources. This is necessary towards establishing the duties and obligations on cities

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<sup>1188</sup> See para 3.3.3 above.

<sup>1189</sup> See para 3.3.3 above.

<sup>1190</sup> See para 3.3.3 above.

<sup>1191</sup> See para 3.3.4 above.

<sup>1192</sup> See para 3.3.4 above.

<sup>1193</sup> See para 3.3.4 above.

pertaining to the latter challenges, which further allow for an investigation questioning the implementation of these duties by cities.

## **CHAPTER 4 NATIONAL LAW AND POLICY ON WATER SERVICE DELIVERY AS APPLICABLE TO MUNICIPALITIES**

### **4.1 Introduction**

For various reasons, including capacity, historical, political, and socio-economic factors, the country is in deep water regarding the fulfilment of the constitutional right of access to sufficient water.<sup>1194</sup> Belinskij, Kotzé, and Fuo<sup>1195</sup> state, while South Africa has made some progress in terms of fulfilling the constitutional water right given the Apartheid regime's ignorance towards the water-related needs of the majority of the country's inhabitants, the continuous development of water service provision poses significant legal, governance and economic challenges.

The legal framework pertaining to water, water resources, and water service delivery in South Africa is very elaborate and encompasses numerous laws, policies, norms and standards, regulations, strategies, plans and frameworks. As such, it is not only complicated to navigate, but it would be redundant to discuss all of it in this chapter, given the objective of this chapter is to investigate the rights, duties and obligations flowing from the national law and policy framework in general, as it pertains to certain water service delivery challenges in South African cities and specific city governments. Based on this, some of the main instruments that contribute to the legal framework presiding specifically on water service delivery have been identified. After briefly discussing the general legal framework applicable to service delivery, the chapter will first introduce the applicable laws, policies, frameworks, strategies and plans.

Subsequently, within the parameters of the relevant identified legal framework, the study will analyse how, if at all, the challenges of non-revenue water, illegal water connections, insufficient data, and the sustainability of water services in cities are addressed by the legal framework. Finally, based on the obligations and content derived from the latter investigation, the chapter will analyse how specific cities have responded to the legal framework governing the aforementioned challenges. These cities include the City of

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<sup>1194</sup> Du Plessis 2010 *RECIEL* 327.

<sup>1195</sup> Belinskij, Kotzé and Fuo 2017 *AJICL* L 270.

Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality. Lastly, some concluding remarks will be made in terms of the findings of this analysis.

#### **4.2 The general legal framework applicable to service delivery**

Cities are responsible for service delivery in the country, subject to the legislation and oversight of national and provincial government. Various human settlement typologies, as mentioned in the *IUDF* and the *Structures Act*,<sup>1196</sup> form the basis of these cities. Specifically, these typologies may be found in the various types of municipalities provided for in the *Constitution*.<sup>1197</sup>

Section 155 of the *Constitution* provides for the establishment of municipalities and holds that there are three categories of municipalities. The first of these is Category A municipalities, which have exclusive municipal executive and legislative authority in its area. Next is Category B municipalities that share municipal executive and legislative authority in its area, with a Category C municipality within whose area it falls. Finally, the last category is Category C municipalities that have municipal executive and legislative authority in an area that includes more than one municipality.<sup>1198</sup> Category A municipalities, also known as metropolitan areas, are the largest municipalities<sup>1199</sup>, whereas Category B municipalities are classified as areas outside of metropolitan zones and are also known as local municipalities.<sup>1200</sup> Finally, Category C municipalities, also called district municipalities, comprise of numerous local municipalities that fall within the same delineated district.<sup>1201</sup> The executive and legislative authority of a municipality is vested in its Municipal Council, the composition, membership, and terms of which are also governed by the *Constitution*.<sup>1202</sup>

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<sup>1196</sup> See para 1.1 above.

<sup>1197</sup> See ss 155 of the *Constitution*.

<sup>1198</sup> See ss 155(1)(a) – (b) of the *Constitution*.

<sup>1199</sup> S 2(a) – (d) of the *Structures Act*.

<sup>1200</sup> S 3 of the *Structures Act*.

<sup>1201</sup> Ss 83(1) – (2), S 155(1)(c) of the *Constitution*.

<sup>1202</sup> See ss 151(2), 157, 158, and 159 of the *Constitution*.

The service delivery provided by these municipalities must conform to the principles of participatory democracy, accountability, and sustainability, in addition to the country's developmental goals.<sup>1203</sup> The latter may be extrapolated from the *Constitution* as the principal legislation that describes municipalities' obligation to deliver services to their people and people's entitlements to such services. In particular, section 152(1) refers in this regard, since it provides for the objects of local government, namely:<sup>1204</sup>

- (a) to provide democratic and accountable government for local communities;
- (b) to ensure the provision of services to communities in a sustainable manner;
- (c) to promote social and economic development;
- (d) to encourage the involvement of communities and community organisations in the matters of local government; and
- (e) to encourage the involvement of communities and community organisations in the matters of local government.

Section 156 of the *Constitution* further emphasises the service delivery function of local governments. It provides municipalities with executive authority regarding matters listed in Part B of Schedule 4 and Part B of Schedule 5 of the *Constitution*, as well as any other matter that may be assigned to it by either national or provincial legislation. Of relevance within the context of this study is Part B of Schedule 4, which provides the authority to local governments to see to water and sanitation services, limited only to potable water supply systems and domestic wastewater and sewage disposal systems. A municipality may both make and administer by-laws as far as is necessary for the effective administration of the matters over which it has authority, subject to the condition that it is not in conflict with national or provincial legislation.

Although the national and provincial governments have the executive and legislative authority to ensure the adequate performance of municipalities regarding their functions listed in Schedules 4 and 5 of the *Constitution*, these authorities are not allowed to either compromise or impede a municipality's right or abilities to exercise its powers or perform functions under its authority. This is affirmed by section 151(3) of the *Constitution*, which

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<sup>1203</sup> See s 152(1)(a) – (e) and s 153 of the *Constitution*.

<sup>1204</sup> See s 152(1)(a) – (e) of the *Constitution*.

speaks to the status of municipalities, and assigns the right to municipalities to govern the affairs of its community. Nevertheless, municipalities remain directly accountable to the community as to how they execute their function.

### **4.3 The legal framework for water service delivery in cities**

This section analyses the national law and policy framework concerning water service delivery in cities. While this section does not aim to be exhaustive of the entire legislative framework, the most pertinent aspects will be discussed. Some laws that are incidental to the legislative framework on water service delivery, such as the *National Housing Act*,<sup>1205</sup> the *National Health Act*,<sup>1206</sup> and the *National Environmental Management: Biodiversity Act*<sup>1207</sup> will not be discussed in this section, but are nonetheless noted as forming a part of this framework. The purpose of this section is to establish exactly what is expected from local governments regarding water service delivery, including the rules, duties, principles and values that form the foundation of water service delivery law. Subsequently, this section, to the exclusion of the *Water Supply and Sanitation Policy White Paper* (1994), will inform the following section as to the legal framework governing the focal water service delivery challenges discussed in this study.

#### **4.3.1 The Water Supply and Sanitation Policy White Paper (1994)**

The *Water Supply and Sanitation Policy White Paper* (1994) (hereafter the White Paper) is one of the three principal instruments (including the *WSA* and the *NWA*) that offers content pertaining to the mandate on local governments to provide water and sanitation services to their communities.<sup>1208</sup> The White Paper marks one of the new democratic government's first policy responses to the country's far-reaching water problems. Accordingly, the object of the White Paper was to set out the policy for the then-new Department, focusing specifically on water supply and sanitation services.<sup>1209</sup>

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<sup>1205</sup> The *National Housing Act* 107 of 1997.

<sup>1206</sup> The *National Health Act* 61 of 2003.

<sup>1207</sup> The *National Environmental Management: Biodiversity Act* 10 of 2004.

<sup>1208</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 446.

<sup>1209</sup> See generally the White Paper.

No mention is made of the functions of the Department concerning issues such as the management of the quality or quantity of water resources. However, the White Paper clearly states that, at that time, the absence of clear policy is of great concern, mainly because there was consensus that water service provision should be implemented at the local level.<sup>1210</sup> The White Paper thus highlighted the need for a clear framework to follow, which would enable local governments to play their role in providing water services with certainty regarding the nature and extent of the support they could expect from the provincial and national governments.<sup>1211</sup> Essentially, the purposes of the White Paper was to paint a picture of the country's history as far as water supply and sanitation development was concerned; to explain the development approach that guided policy formulation; to provide additional policy and briefing information on significant topics; to suggest basic policy principles; to provide an outline of the institutional framework proposed for water and sanitation services; to offer standards and guidelines for basic service delivery; and to set out policy for water services financing.<sup>1212</sup>

The White Paper may be seen as a response to the targets, policy and legislative objectives in the Reconstruction and Development Programme<sup>1213</sup> (hereafter, the RDP). The African National Congress (hereafter, the ANC) decisively won the elections of 1994 by, *inter alia*, campaigning extensively on the back of the RDP, which linked growth and equity by promoting the reduction of extreme poverty and the imbalances emanating from the Apartheid regime.<sup>1214</sup> Due to its equity-growth premise, however, the RDP received a significant amount of criticism, especially since it was posited that the RDP represented no more than a documentation of the needs of the country's people, and that the RDP could not be relied on as an economic policy which could aid in South Africa's development.<sup>1215</sup>

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<sup>1210</sup> The White Paper 2.

<sup>1211</sup> The White Paper 2.

<sup>1212</sup> The White Paper 2.

<sup>1213</sup> The *Reconstruction and Development Programme* of 1994.

<sup>1214</sup> Nleya 2008 *Development Southern Africa* 270.

<sup>1215</sup> Nleya 2008 *Development Southern Africa* 270 – 271.

The Growth, Employment and Redistribution<sup>1216</sup> strategy (hereafter, the GEAR) soon followed<sup>1217</sup> and represented a turnaround of the ANC's predominantly redistributive policies to a market-friendly approach.<sup>1218</sup> These developments had an impact on the ensuing water policy, particularly because, historically, the economic policy trajectory of a certain era is reflected in the water policy of that time.<sup>1219</sup> For example, the Dublin Principles developed in 1992, which advocated that water has an economic value, articulated the shift towards market-focused approaches in the water sector.<sup>1220</sup>

The RDP stated, amongst other things, that water policy should recognise water as an indivisible asset belonging to all South Africans, and, as such, set targets including providing 20 to 30 litres of water per capita per day (within 200 metres) in the following five to seven years.<sup>1221</sup> In the medium term, the RDP set out 50 to 60 litres per capita per day as a medium-term goal,<sup>1222</sup> which already indicated that there is some expectation for the state to continuously improve the amount of water provided, in order to fully realise the constitutional right to have access to sufficient water. Further, the RDP put in motion policy objectives such as community-based development of water services and the notion of "some for all, rather than all for some".<sup>1223</sup>

These policy objectives were directly echoed in the White Paper and were included under the policy principles for water supply and sanitation.<sup>1224</sup> In addition to the above, the White Paper promotes policy principles such as that basic services are a human right.<sup>1225</sup> With regards to this principle, the White Paper states, without hesitation, that basic services as a human right:

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<sup>1216</sup> *Growth, Employment and Redistribution: A Macroeconomic Strategy of 1996.*

<sup>1217</sup> For an analysis of GEAR, see generally Gomersall 2004 *Development Southern Africa*.

<sup>1218</sup> Nleya 2008 *Development Southern Africa* 270.

<sup>1219</sup> Nleya 2008 *Development Southern Africa* 271.

<sup>1220</sup> See para 2.3.1.5 above; Nleya 2008 *Development Southern Africa* 271.

<sup>1221</sup> The RDP 80.

<sup>1222</sup> The RDP 80.

<sup>1223</sup> The RDP 80.

<sup>1224</sup> The White Paper 8.

<sup>1225</sup> The White Paper 8.



...*will* be interpreted, in terms of the Constitution, as a right to a level of services adequate to provide a healthy environment. They *do not* imply the right of an individual person or community to demand services as the expense of others.<sup>1226</sup>

This interpretation of basic services as a human right is reflective of the international and African-regional legal, judicial and scholarly views concerning the human right to water.<sup>1227</sup> Admittedly, the White Paper states that these principles were informed by local and international experience,<sup>1228</sup> yet it remains a very progressive and insightful view for its time, and later South African judicial perspectives are reminiscent of this understanding.<sup>1229</sup>

As per the White Paper, principle one, namely that development should be demand-driven and community-based, and principle two, that basic services are a human right, may be in conflict with principle three, which expresses the "some for all rather than all for some" notion. This is because principle one suggests a demand-driven philosophy, while the other principles imply a centralised and supply-driven approach. On this issue, the White Paper firmly states that the primary principle is that development should be demand driven and that the latter principles will have a role to play in how the state prioritises its response to the demand of communities.<sup>1230</sup> Upon interpretation, within the context of these water services, the White Paper plainly suggests that the human right to water and the principles of equality and equity should inform the state's provision of water services to communities in accordance with their needs.

The White Paper provides for an additional five policy principles. Principle four entails the equitable regional allocation of development resources, taking into account the population and level of development.<sup>1231</sup> Principle five states that water has economic value and prescribes that the manner in which water and sanitation supply services are provided must resonate with the increasing scarcity of good quality water in the country, while reflecting the value of such water and neither undermines long term sustainability

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<sup>1226</sup> Own emphasis (italics) added; see the White Paper 8.

<sup>1227</sup> See paras 2.3.1 – 2.4.3 above.

<sup>1228</sup> The White Paper 8.

<sup>1229</sup> See paras 2.5.2.1 – 2.5.2.3 above.

<sup>1230</sup> The White Paper 8 – 9.

<sup>1231</sup> The White Paper 8.

nor economic growth.<sup>1232</sup> Principle six states that the "user pays", which was deemed an essential principle to ensure both sustainable and equitable development, including effective and efficient management.<sup>1233</sup>

Principle seven provides for integrated development, which became an integral principle in water resource management,<sup>1234</sup> as prescribed further on by the *NWA*. Regarding this principle, the White Paper put forward that both water and sanitation development would not be possible when attempted in isolation from the development taking place in other sectors. Therefore, coordination among all levels and line functionaries of government and other involved parties was deemed necessary.<sup>1235</sup> Finally, principle eight expressed the need for environmental integrity and that the environment must be considered and protected during all development-related activities.<sup>1236</sup>

Regarding the role of local government, the White Paper stipulated that the key to sustainable water and sanitation development is the existence of a competent and functional local government.<sup>1237</sup> The White Paper realised that, back then, it was unlikely for local governments to be effectively established in all areas for some time. Therefore, some water and sanitation services-related competencies were assigned to the national government in order to support the development of local governments.<sup>1238</sup> This included the expansion of the mandate of water boards to provide water supplies to the final consumer, in addition to the Minister being empowered to establish "Local Water Committees" that would undertake local water and sanitation service provision.<sup>1239</sup>

Following this, the White Paper set out to determine certain guidelines for the provision of water services. These guidelines were the minimum services required to ensure the health of communities, and the White Paper advised that the guidelines should be seen as the minimum standards to be applied in publicly funded schemes, subject to the

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<sup>1232</sup> The White Paper 8.

<sup>1233</sup> The White Paper 8.

<sup>1234</sup> The White Paper 8.

<sup>1235</sup> The White Paper 8.

<sup>1236</sup> The White Paper 8.

<sup>1237</sup> The White Paper 11.

<sup>1238</sup> The White Paper 11.

<sup>1239</sup> The White Paper 11.

approved relaxation thereof.<sup>1240</sup> The White Paper advised that higher standards could be applied, but that the direct correlation of the standard of service provided and the costs thereof should be noted.<sup>1241</sup>

A basic water supply was defined as comprising certain elements, such as a specific quantity, cartage, availability, assurance of supply, quality, and upgradability.<sup>1242</sup> A basic quantity was established as 25 litres per person per day for direct consumption, the preparation of food, and for personal hygiene.<sup>1243</sup> The White Paper did not consider this amount as adequate for a full, productive, and healthy life, which is the reason for it being expressed as a minimum guideline only.<sup>1244</sup>

In terms of cartage, the maximum suggested distance a person should have to cart water to their dwelling was 200 metres.<sup>1245</sup> In steep terrains, it is suggested that the distance should be shortened to account for the additional effort necessary to cart water up or down steep slopes.<sup>1246</sup> The availability, on the other hand, was estimated at a flow rate of no less than ten litres, provided that the water should be available on a regular and daily basis.<sup>1247</sup>

No mention was made concerning what constitutes a "regular" basis. However, as per the factor of "assurance of supply", one may glean that the aim was not to have more than a week's interruption of supply per year.<sup>1248</sup> The "assurance of supply" further included that communities should be provided with water security, and that, both the maintenance and operation of the water infrastructure system must be effective.<sup>1249</sup>

Regarding the suggested quality of a basic water supply, the White Paper provided that the quality of water should be in accordance with any current minimum standards on

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<sup>1240</sup> The White Paper 14.

<sup>1241</sup> The White Paper 14.

<sup>1242</sup> See the White Paper 14 – 15.

<sup>1243</sup> The White Paper 15.

<sup>1244</sup> The White Paper 15.

<sup>1245</sup> The White Paper 15.

<sup>1246</sup> The White Paper 15.

<sup>1247</sup> The White Paper 15.

<sup>1248</sup> The White Paper 15.

<sup>1249</sup> The White Paper 15.

health-related microbial and chemical contaminants.<sup>1250</sup> The potability of water is also raised, and it is proposed that the water should be acceptable in terms of its taste, odour, and appearance.<sup>1251</sup> Finally, the White Paper proposed certain aspects to keep in mind regarding the possible need of communities to upgrade their basic services such as to provide for household connections. This should be considered during the planning stage of water systems, to prevent water provision failure resultant from either illegal water connections or expensive upgrades due to growing demand.<sup>1252</sup>

Many of the above suggestions regarding the content of a basic water supply remind one of the provisions made in General Comment 15 regarding the right to water.<sup>1253</sup> However, there are notable differences in the White Paper's suggestions, especially concerning the cartage of water, the assurance of supply, and the upgradability of water service connections.<sup>1254</sup> The following section will look at the primary piece of legislation on water services provision in the country, during which some pertinent differences may be observed regarding how the *WSA* possibly implemented the suggestions from the White Paper, in both its own content and the resultant regulations thereunder.

#### **4.3.2 The Water Services Act 108 of 1997**

While this is not the first time this study has broached the *WSA*,<sup>1255</sup> there is much left to be said concerning its role in the ultimate provision of water services in South Africa.<sup>1256</sup> The *WSA* explicitly holds that ensuring access to water services lies with water services authorities.<sup>1257</sup> The *WSA* seeks to guide these "water services authorities" (meaning any municipality responsible for ensuring access to water services, including district or rural councils)<sup>1258</sup> in undertaking their constitutional mandate while protecting the interests of consumers. The Act further provides various definitions of different stakeholders in the

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<sup>1250</sup> The White Paper 15.

<sup>1251</sup> The White Paper 15.

<sup>1252</sup> The White Paper 15.

<sup>1253</sup> See para 2.3.1.11 above.

<sup>1254</sup> See para 2.3.1.11 above.

<sup>1255</sup> See paras 1.4 and 2.5.1.2 above.

<sup>1256</sup> See Muller and Uys *Amanzi Ayimpilo (water is life): Regulatory Governance of the Water Sector in South Africa* 7.

<sup>1257</sup> S 11 of the *WSA*.

<sup>1258</sup> S 1(xx) of the *WSA*.

water service provision process. A "water services provider" means any person who provides water services to consumers or to another water services institution, but excludes a water services intermediary.<sup>1259</sup> This latter definition underlines the fact that there is a difference between the constitutional obligation to ensure service delivery (by a water services authority) and the actual provision of water (by a water services provider).<sup>1260</sup>

A "water board", for instance, is understood as an organ of state established or regarded as having been established in terms of the *WSA* to perform, as its primary activity, a public function.<sup>1261</sup> On the other hand, a "water services intermediary" is defined as any person who is obliged to provide water services to another, by way of contract, where the provision of water is either incidental or the main purpose of the contract.<sup>1262</sup> Finally, a "water services institution" means a water services authority, provider, board and committee.<sup>1263</sup> By their definition, one may deduce the roles these stakeholders play in the process of water service delivery, but Chapters III – VII of the *WSA* provides detailed content regarding, *inter alia*, the powers, duties, establishment, registration, and governance of these stakeholders.

Integral to the duty of water services authorities is the definition of "water supply services", namely the abstraction, conveyance, treatment, and distribution of potable water, water intended to be converted to potable water, or water for commercial use, excluding water for industrial use.<sup>1264</sup> The *WSA* guarantees the right to access to a basic water supply, and every water services institution is expected to take reasonable measures to realise this right.<sup>1265</sup> Every water services authority, or municipality, must provide for certain measures to ensure the realisation of the water right.<sup>1266</sup> The aforementioned rights are, however, subject to any limitations set out in the *WSA*.<sup>1267</sup>

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<sup>1259</sup> S 1(xxIII) of the *WSA*.

<sup>1260</sup> Swart and Adams "Water services provision and the protection of water resources" 455.

<sup>1261</sup> S 1(xviii) of the *WSA*.

<sup>1262</sup> S 1(xxii) of the *WSA*.

<sup>1263</sup> S 1(xxi) of the *WSA*.

<sup>1264</sup> S 1(xxv) of the *WSA*.

<sup>1265</sup> S 3(1) – (2) of the *WSA*.

<sup>1266</sup> S 3(3) of the *WSA*.

<sup>1267</sup> S 3(4) of the *WSA*.

From this definition, one may extrapolate certain issues, such as the different potential role-players involved in the water supply process and the various duties that municipalities must fulfil in order to actually supply water to communities. As such, one may further expect that there will be various regulatory consequences. With this in mind, one is able to comprehend why the legal framework concerning water services provision is so lengthy and complex.

It is understandable why the White Paper advocated for clear laws and policies to follow. In particular, one may argue that it is especially necessary for the *WSA* to provide unambiguous guidance to water services authorities and the various stakeholders involved in water service delivery.<sup>1268</sup> Particularly, the latter is also necessary to foster cooperation, rather than allow for overlapping duties and functions, which may lead to the fragmented implementation of water service delivery duties.<sup>1269</sup> The role of the *WSA* can, therefore, not be overstated, given the millions of people whose lives and livelihoods depend on the provision of adequate water services.

The main objectives of the *WSA* are ten-fold.<sup>1270</sup> Firstly, the Act provides for the right of access to basic water supply and the right to basic sanitation that is necessary to ensure sufficient water, including an environment that is not harmful to either human health or wellbeing.<sup>1271</sup> The Act sets out to determine national standards and norms and standards for water services tariffs,<sup>1272</sup> while providing for the preparation and adoption of water services development plans by municipalities.<sup>1273</sup>

A regulatory framework for water services institutions and water services intermediaries is established,<sup>1274</sup> in addition to the establishment and disestablishment of water services committees, water boards and their related powers and duties.<sup>1275</sup> Provision is made for

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<sup>1268</sup> Development Bank of Southern Africa *Municipal compliance with water services policy: A challenge for water security* 4 – 9.

<sup>1269</sup> Development Bank of Southern Africa *Municipal compliance with water services policy: A challenge for water security* 4 – 9.

<sup>1270</sup> See s 2(a) – (j) of the *WSA*.

<sup>1271</sup> S 2(a) of the *WSA*.

<sup>1272</sup> S 2(b) of the *WSA*.

<sup>1273</sup> S 2(c) of the *WSA*.

<sup>1274</sup> S 2(d) of the *WSA*.

<sup>1275</sup> S 2(e) of the *WSA*.

the monitoring of water services and for intervention by the Minister or by the relevant province.<sup>1276</sup> Further objectives include setting in place financial assistance to water services institutions<sup>1277</sup> and the gathering of information via a national information system and the distribution of the relevant information.<sup>1278</sup>

The *WSA* includes objectives regarding holding water services providers accountable,<sup>1279</sup> and promoting effective water resource management and conservation.<sup>1280</sup> The abovementioned objectives of the *WSA* are unpacked throughout the Act and in subsequent regulations, and may also be viewed as a summary of the general duties municipalities and the relevant role-players have to fulfil in order to meet their water service delivery mandate.

For instance, in terms of the obligation towards the provision of a basic water supply, the *WSA* states that everyone has a right of access to basic water supply,<sup>1281</sup> and that every *water services institution* must take reasonable measures to realise this right.<sup>1282</sup> Every *water services authority* must provide for measures to realise this right in its water services development plan.<sup>1283</sup> However, if the water services delivered by the water services institution do not meet the requirements of all its existing consumers, it must give preference to the provision of *basic water supply* and basic sanitation to them. Accordingly, these sections provide the guarantee that even when it is in dire circumstances, a water services institution must at least see to the basic water supply of water (based on the prescribed content thereof) to the community to ensure that their constitutional water right is met. This is echoed by the later norms and standards relating to water tariffs.<sup>1284</sup>

There are, however, some conditions that must be met concerning the provision of water services. A water services provider must determine these conditions for the provision of

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<sup>1276</sup> S 2(f) of the *WSA*.

<sup>1277</sup> S 2(g) of the *WSA*.

<sup>1278</sup> S 2(h) of the *WSA*.

<sup>1279</sup> S 2(i) of the *WSA*.

<sup>1280</sup> S 2(j) of the *WSA*.

<sup>1281</sup> S 3(1) of the *WSA*.

<sup>1282</sup> S 3(2) of the *WSA*.

<sup>1283</sup> S 3(3) of the *WSA*.

<sup>1284</sup> See para 4.3.2.2 below.

water, and ensure that these conditions are publicly accessible and are in accordance with the relevant municipal bylaws.<sup>1285</sup> The conditions set by water services providers must include details pertaining to the technical conditions of either existing or proposed extensions of water supply;<sup>1286</sup> both the structure and determination of tariffs;<sup>1287</sup> the conditions regarding payment for water services;<sup>1288</sup> the conditions under which water service provision may be discontinued or limited;<sup>1289</sup> and procedures for the limitation or discontinuation of services;<sup>1290</sup> and measures aimed at promoting water demand and conservation management.<sup>1291</sup>

Should such supply services have to be discontinued or limited, the procedures followed must be fair and equitable, and ensure that reasonable notice of intention to limit or discontinue water services is given to provide consumers with the opportunity to make representations.<sup>1292</sup> The latter provision is necessary, unless other consumers would be prejudiced, there is an emergency situation, or the customer has interfered with either a limited or discontinued service.<sup>1293</sup> Lastly, procedures relating to the limitation or discontinuation of water service should not result in any person being denied access to basic water services due to issues such as non-payment for services, especially in circumstances where such a person is able to prove to the satisfaction of the relevant municipality that the person is in fact unable to pay for basic services.<sup>1294</sup>

Moreover, municipalities that have been given water services provider-status are required to provide measures in order to promote water conservation and demand management.<sup>1295</sup> These measures should be included in their Water Conservation and

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<sup>1285</sup> S 4(1); 2(a) – (b) of the *WSA*.

<sup>1286</sup> S 2(c)(i) of the *WSA*.

<sup>1287</sup> S 2(c)(ii) of the *WSA*.

<sup>1288</sup> S 2(c)(iii) of the *WSA*.

<sup>1289</sup> S 2(c)(iv) of the *WSA*.

<sup>1290</sup> S 2(c)(v) of the *WSA*.

<sup>1291</sup> S 2(c)(vi) of the *WSA*.

<sup>1292</sup> S 4(3)(a) – (c) of the *WSA*. Importantly, the discontinuation or limitation of a consumer's water should "not result in a person being denied access to basic water services for non-payment, where that person proves, to the satisfaction of the relevant water services authority that he or she is unable to pay for basic services."

<sup>1293</sup> S 4(3)(b)(i) – (iii) of the *WSA*.

<sup>1294</sup> S 4(3)(c) of the *WSA*.

<sup>1295</sup> Wegelin and Jacobs 2012 *Water SA* 415.



Water Demand Management Strategy and Water Services Development Plan.<sup>1296</sup> The aforementioned is necessary in order for municipalities to be able to continue providing, at the minimum, basic water supplies to everyone.

Chapter III of the *WSA* sets out the law relating to water services authorities, specifically in reference to their duty to provide access to water services,<sup>1297</sup> their duty to prepare draft water services development plans,<sup>1298</sup> including the content of these plans,<sup>1299</sup> the adoption thereof or the deviation therefrom,<sup>1300</sup> the development of a new plan,<sup>1301</sup> as well as the duty to report on the implementation of the development plan.<sup>1302</sup> Chapter III also prescribes the legal content for establishing contracts and joint ventures with water services providers,<sup>1303</sup> and for the instances when water services authorities act as the water services provider,<sup>1304</sup> in addition to the making of bylaws pertaining to the provision of water services.<sup>1305</sup> While not all of these aspects are relevant for this study, some main points will briefly be elaborated on.

Every water services authority has the duty towards all consumers or potential consumers in its jurisdiction to progressively ensure affordable, efficient, sustainable and economical access to water services.<sup>1306</sup> This duty is subject to certain conditions. For example, the availability of resources; the need to regulate access to water services in an equitable manner; the duty of consumers to pay reasonable charges; the duty to conserve water; the need for an equitable allocation of resources to all water consumers and potential consumers within the water authority's jurisdiction; and the right of the relevant municipality to limit or discontinue the water provision in circumstances where there is a

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<sup>1296</sup> S 12 of the *WSA*.

<sup>1297</sup> S 11 of the *WSA*.

<sup>1298</sup> S 12 of the *WSA*.

<sup>1299</sup> S 13 of the *WSA*.

<sup>1300</sup> Ss 15 and 17 of the *WSA*.

<sup>1301</sup> S 16 of the *WSA*.

<sup>1302</sup> S 18 of the *WSA*.

<sup>1303</sup> S 19 of the *WSA*.

<sup>1304</sup> S 20 of the *WSA*.

<sup>1305</sup> S 21 of the *WSA*.

<sup>1306</sup> S 11(1) of the *WSA*.

failure by the consumer to comply with reasonable conditions regarding the provision of such services.<sup>1307</sup>

To ensure access to water services, it is the duty of the water services authority to consider specific factors, e.g., any alternative methods of providing access to water, the need for low costs, the requirements of equity, as well as the availability of resources from neighbouring water services authorities.<sup>1308</sup> Moreover, a water services authority may by no means unreasonably refuse, or fail to provide access to, water services to any consumer or potential consumer within its area of jurisdiction.<sup>1309</sup> Should an emergency situation arise, a water services authority is required to take reasonable steps to provide a basic water supply and basic sanitation services to anyone within its jurisdictional area, and may do this at its own cost.<sup>1310</sup> A water services authority may, however, place a reasonable limitation on the use of water services.<sup>1311</sup>

In terms of Chapter II of the *WSA*, the Minister has the authority to prescribe compulsory national standards, including those relating to water service tariffs; the provision of water services; the quality of water; the sustainable and effective use of water resources for water service delivery purposes; the nature, sustainability, operational efficient and economic viability of water services; the construction and functioning of water services works as well as consumer installations; and the requirements for persons who install and operate water services works.<sup>1312</sup>

#### *4.3.2.1 Compulsory National Standards and Measures to Conserve Water*

The *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*<sup>1313</sup> have been determined under sections 9(1) and 73(l)(j) of the *WSA*. Many of the regulations in this regard are especially relevant to the challenges of non-revenue water

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<sup>1307</sup> See s 11(2)(a) – (g) of the *WSA*.

<sup>1308</sup> See s 11(3)(a) – (f) of the *WSA*.

<sup>1309</sup> See s 11(4) of the *WSA*.

<sup>1310</sup> See s 11(5) of the *WSA*.

<sup>1311</sup> See s 11(6) of the *WSA*.

<sup>1312</sup> See s 9(1)(a) – (f) of the *WSA*; see also Swart and Adams "Water services provision and the protection of water resources" 455.

<sup>1313</sup> *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

and illegal water connections and are discussed below.<sup>1314</sup> Other regulations are of specific value to certain aspects of water service delivery.

For instance, regulation 5 governs the quality of potable water, an integral component towards fulfilling the right to access to sufficient water.<sup>1315</sup> This section provides that water services authorities must establish a suitable programme for the sampling of the quality of potable water provided by it to the water users in its water services development plan.<sup>1316</sup> The water sampling programme must state the points at which the water will be sampled, as well as the frequency of such sampling, and for which determinants and substances the water will be tested. Guidelines on the quality of potable water can be found in the *South African Water Quality Guidelines*<sup>1317</sup> developed by the then Department of Water Affairs and Forestry.<sup>1318</sup>

#### *4.3.2.2 Norms and Standards in Respect of Tariffs for Water Services*

Tariffing is the financial component for recovering the costs related to providing services.<sup>1319</sup> In terms of section 10 of the *WSA*, the Minister may prescribe norms and standards regarding the tariffs for water services. These norms and standards may differentiate on an equitable basis between the different users and types of water services, as well as different geographic areas, taking into account, for example, the physical and socio-economic attributes of every area.<sup>1320</sup> Furthermore, these norms and standards may provide for tariffs to be used to promote or achieve water conservation.<sup>1321</sup>

The norms and standards may only be prescribed with the concurrence of the Minister of Finance. The Minister must consider certain factors in prescribing the norms and standards, such as social equity; the national standards prescribed by him or her; the

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<sup>1314</sup> See para 4.4 below.

<sup>1315</sup> Reg 5 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1316</sup> Reg 5 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1317</sup> Department of Water Affairs and Forestry *South African Water Quality Guidelines Volume 1: Domestic Use* 1996.

<sup>1318</sup> Reg 5 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1319</sup> See Dugard *The right to water in South Africa* 6.

<sup>1320</sup> See s 10(2)(a)(i) – (iii) of the *WSA*.

<sup>1321</sup> S 10(2)(d) of the *WSA*.

financial sustainability of the water services in the geographic area in question; and the recovery of costs reasonably associated with providing the water services.<sup>1322</sup> Water services institutions are responsible for determining their own tariffs for the provision of water services. However, a tariff that is substantially different from any prescribed norms and standards may not be used.<sup>1323</sup>

The regulations pertaining to water tariff norms and standards were published in 2001 and took effect soon after in 2003.<sup>1324</sup> These regulations state, for instance, that a water services institution must give consideration to the right of access to a basic water supply when determining if, and which, water services should be subsidised.<sup>1325</sup> The institution may use any source of funds, such as those received from municipal rates and taxes or from transfers from either national or provincial government, or any other sources, to subsidise a water services tariff.<sup>1326</sup> Furthermore, when a water services institution determines its water tariffs that apply to consumers or other users within its area of jurisdiction, it must differentiate between certain categories. These categories include, for example, water supply to households, industrial use of water supplied through a water services works and water supply services other than for household or industrial use.<sup>1327</sup>

Water tariffs applying to water services for households must be differentiated based on the different level of services provided.<sup>1328</sup> These levels of service entail the supply of water through a communal water services works<sup>1329</sup> or through a water services works or installation designed to provide a controlled amount of water.<sup>1330</sup> An additional level of

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<sup>1322</sup> S 10(3) of the *WSA*.

<sup>1323</sup> S 10(4) of the *WSA*.

<sup>1324</sup> *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1325</sup> Reg 3(2) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1326</sup> Reg 3(1) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1327</sup> Reg 4(1) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1328</sup> Reg 4(2) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1329</sup> A communal water services works is defined as a consumer connection via which water services are provided to more than one household; see Reg 1 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1330</sup> A controlled water volume is described as a supply of water to a consumer that is intentionally limited or restricted to a predetermined maximum volume for a certain measured period; see Reg 1 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

service is the supply of water to a household through a water services works or consumer installation that is designed to provide an uncontrolled amount of water.<sup>1331</sup>

These volume-based charges are enforced in South Africa through a rising block tariff structure, which includes three or more tariff blocks where the tariff increases for higher consumption blocks.<sup>1332</sup> A block tariff structure entails the consumption level for each block, defined as the volume that is consumed in a 30-day period by a household.<sup>1333</sup> The first tariff block, which is the lowest tariff block, has a maximum consumption level of six kilolitres and is set at the lowest tariff, including a zero amount.<sup>1334</sup> The last or highest tariff block is set at an amount that discourages high water usage, and that reflects the costs that would have to be incurred to increase the capacity of the water supply infrastructure to see to the incremental rise in demand.<sup>1335</sup>

#### **4.3.3 The National Water Act 36 of 1998**

The purpose of the *NWA* is to ensure that the nation's water resources are protected, used, developed, conserved, controlled, and managed in ways that consider certain factors.<sup>1336</sup> These factors include meeting the basic human needs of both the present and future generations, promoting equitable access to water,<sup>1337</sup> providing for the growing demand for water use, and promoting the efficient, sustainable, and beneficial use of water in the public interest, etc.<sup>1338</sup> While one may argue that the *NWA's* value, as it concerns water service delivery, in particular, is that it provides for the protection of water

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<sup>1331</sup> An uncontrolled volume of water supply is the supply of water services to a consumer that is not intentionally restricted or limited to any specific volume; see Reg 1 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1332</sup> See Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 701; Reg 6(2) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1333</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 701.

<sup>1334</sup> Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 701.

<sup>1335</sup> Reg 6(2) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1336</sup> Muller and Uys *Amanzi Ayimpilo (water is life): Regulatory Governance of the Water Sector in South Africa* 7.

<sup>1337</sup> The provision of equitable access to water is one of the most important reformations within South Africa's water law; see Viljoen *The Public Trust Doctrine in South African Water Law* 29 – 30.

<sup>1338</sup> S 2(a) – (k) of the *NWA*.

resources to ensure the availability of water in order for the right thereto, and other interrelated rights, to be fulfilled, the *NWA* also provides for issues such as the entitlement to water use.<sup>1339</sup> In this instance, it is held that a person may use water in or from a particular water resource for purposes such as *reasonable* domestic use, domestic gardening, animal watering, firefighting, and recreational use.<sup>1340</sup>

An integral aspect of the *NWA* is the creation of the "Reserve" as per the Act. The Reserve is defined as the quantity and quality of water that is required to satisfy basic human needs by securing a basic water supply, as directed by the *WSA*, for persons who are now or who will in the reasonably near future be relying upon, taking water from, or being supplied from, the relevant water resource; and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.<sup>1341</sup> Thus, the Reserve consists of a basic human needs reserve, which in essence provides for water for drinking, food preparation, and personal hygiene.<sup>1342</sup>

Additionally, it consists of an ecological reserve.<sup>1343</sup> This is the only right to water to be found in the *NWA*, and it takes priority over all other water uses. Thus, the amount of water that is required for the Reserve must be safeguarded before the allocation of water resources to other users.<sup>1344</sup> As a consequence, the availability of water resources for the provision of at least a basic water supply to communities is thereby protected and ensured.

The *NWA* provides vital recognition that water is a precious and scarce resource that belongs to all the people of the country.<sup>1345</sup> The *NWA* indicates that water resources must be used, developed, protected, conserved, controlled, and managed in a manner that

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<sup>1339</sup> See s 4 of the *NWA*.

<sup>1340</sup> Additionally, it provides that any entitlement granted to any person by or under the Act, shall replace any right to use water which that person might alternatively have been able to enjoy, or enforce under any other law – a) to take or use water; b) to obstruct or divert a flow of water; c) to affect the quality of any water; d) to receive any particular flow of water; e) to receive a flow of water of any particular quality; or f) to construct, operate or maintain any waterwork; see s 4(1) – (4)(a) – (f) of the *NWA*.

<sup>1341</sup> S 1 of the *NWA*.

<sup>1342</sup> Part 3 s 16 of the *NWA*.

<sup>1343</sup> Part 3 s 16 of the *NWA*.

<sup>1344</sup> Gowlland-Gualtieri *South Africa's Law and Policy Framework: Implications for the right to water* 4.

<sup>1345</sup> Swart and Adams "Water services provision and the protection of water resources" 448.

follows the "central guiding principles" of sustainability, equity as well as efficiency.<sup>1346</sup> In addition to these principles, the *NWA* confirms that the national government<sup>1347</sup> is the public trustee of South Africa's water resources and promotes integrated water resource management with the participation of all stakeholders.<sup>1348</sup>

The Act further identifies the DWS as the custodian of all water resources in the country.<sup>1349</sup> Hence, the *NWA* incorporates the concept of "public trusteeship", which encapsulates the sovereign's duty to act as the guardian of specific interests, to the benefit of the entire nation.<sup>1350</sup> The incorporation of this concept includes a so-called stewardship ethic in South Africa's natural resources law.<sup>1351</sup> Even more, the concept has significantly influenced the law of property and the theory thereof in South Africa, given that the notion directly challenges ideas such as "ownership" and "property" within the South African jurisprudence.<sup>1352</sup>

#### **4.3.4 The Local Government: Municipal Structures Act 117 of 1998**

The *Structures Act* provides for the definitions of the different types of municipalities while providing for the establishment of municipalities in line with the requirements pertaining to the categories and types of municipalities.<sup>1353</sup> The Act also establishes the required criteria and makes provision for the division of powers and functions between the different types of municipalities.<sup>1354</sup> The different types and categories of

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<sup>1346</sup> Chapter 1 of the *NWA*.

<sup>1347</sup> S 3(1) of the *NWA*. Although water services have been allocated as a duty of local government, it is evident that municipalities must nonetheless comply with all laws concerning water resource protection and water services delivery in South Africa; Swart and Adams "Water services provision and the protection of water resources" 449.

<sup>1348</sup> See para 2.5.1.3 above.

<sup>1349</sup> S 3 of the *NWA*.

<sup>1350</sup> See Van der Schyff 2010 *PELJ* 122 – 125; Brady 1990 *BC Env'tl Aff L Rev* 633; Stevens 1980 *UC Davis LR* 200; Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 339 – 354.

<sup>1351</sup> Van der Schyff 2010 *PELJ* 122 – 125; Brady 1990 *BC Env'tl Aff L Rev* 633; Stevens 1980 *UC Davis LR* 200; Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 339 – 354.

<sup>1352</sup> Van der Schyff 2010 *PELJ* 122 – 125; Brady 1990 *BC Env'tl Aff L Rev* 633; Stevens 1980 *UC Davis LR* 200; Van der Schyff and Viljoen 2008 *The Journal for Transdisciplinary Research in Southern Africa* 339 – 354.

<sup>1353</sup> See chapter 1 – 2 of the *Structures Act*.

<sup>1354</sup> See chapter 1 – 2 of the *Structures Act*.

municipalities have been alluded to above.<sup>1355</sup> Therefore, this section will briefly elaborate on the latter to determine the powers and functions of the different types of municipalities relevant to water service provision.

A metropolitan municipality has the authority to perform all of the powers and functions assigned to a municipality as per the *Constitution*.<sup>1356</sup> A district municipality, on the other hand, has various functions and powers concerning water. These include, *inter alia*, providing potable water supply systems; ensuring integrated development planning for the entire district municipality; providing for domestic waste water and sewerage disposal systems; the formation of solid waste disposal sites as it relates to the determination of a waste disposal strategy, the regulation of waste disposal, and the establishment, operation and control of waste disposal sites; as well as the imposition of taxes, duties and levies relating to all of the municipality's functions, or as may be assigned to the district municipality as per the national legislation.<sup>1357</sup>

Local municipalities have various functions and powers that relate to water, such as fire-fighting services, municipal planning, cleansing, building regulations, storm-water management systems in built-up areas, municipal roads, as well as refuse removal, amongst others.<sup>1358</sup> As per section 85(1) of the *Structures Act*, the Member of the Executive Council responsible for local governments in the relevant province may, subject to other provisions under this section, adjust the division of the functions and powers between a local and a district municipality. A power or function that is ordinarily vested in a local government may be allocated to a district municipality.<sup>1359</sup> The opposite is also possible, with the exception of the following functions and powers: the integrated development planning for the district municipality as a whole, the receipt, allocation and

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<sup>1355</sup> See para 4.2 above.

<sup>1356</sup> S 83(1) of the *Structures Act*, see also Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 235.

<sup>1357</sup> See s 84(1) of the *Structures Act*.

<sup>1358</sup> See s 84(2) of the *Structures Act*.

<sup>1359</sup> S 85(1)(a) of the *Structures Act*.



distribution of grants made to the municipality, and the imposition and collection of taxes, levies, and duties relating to the municipality's duties in section 84(1) of the *Act*.<sup>1360</sup>

#### **4.3.5 The Local Government: Municipal Systems Act 32 of 2000**

Generally, the *Local Government: Municipal Systems Act*<sup>1361</sup> (hereafter, the *Systems Act*) sets out the core principles, procedures and framework to allow municipalities to uplift their community both economically and socially through guaranteeing affordable and universal access to basic services. The Act refers to the provision of "basic municipal services", defined as a municipal service that is necessary to ensure an acceptable and reasonable quality of life, and, without which, public health or the safety of the environment may be threatened.<sup>1362</sup>

Chapter 8 of the *Systems Act* determines extensive provisions regarding municipal services. Some of the issues covered include setting service tariffs and tariff policy.<sup>1363</sup> In terms of the provision of services, issues such as the mechanisms necessary for the provision of services, occasions when municipalities must review and decide on mechanisms to provide municipal services, municipal entities, and many other issues related to service provision are set out.<sup>1364</sup> Other issues covered include service delivery agreements involving competitive bidding, municipal service districts, as well as regulations and guidelines concerning services.<sup>1365</sup> Therefore, the *Systems Act* may be described as an all-encompassing set of rules concerning, specifically, municipalities and their service delivery mandate. Some of the sections of this *Act*, however, are especially relevant to the scope of this thesis.

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<sup>1360</sup> S 85(1)(b) of the *Structures Act* holds that ss 84(1)(a), (o), and (p) is to be excluded from the provision in s 85(1) of the *Structures Act*. For a discussion of the *Structures Act* as it relates to water services, see Thompson *Water Law: A Practical Approach to Resource Management and the Provision of Services* 235 – 237.

<sup>1361</sup> The *Local Government: Municipal Systems Act* 32 of 2000.

<sup>1362</sup> S 1 of the *Systems Act*. See also Dugard *The right to water in South Africa* 6; Muller and Uys *Amanzi Ayimpilo (water is life): Regulatory Governance of the Water Sector in South Africa* 8.

<sup>1363</sup> See ss 74, 75 of the *Systems Act*.

<sup>1364</sup> See ss 76 – 82 of the *Systems Act*.

<sup>1365</sup> See ss 83 – 94 of the *Systems Act*.

For instance, the *Systems Act* provides clarity as to the extent of municipalities' obligation to provide basic urban services. Section 73 of the *Systems Act* states that:

- (1) A municipality must give effect to the provisions of the Constitution and -
  - (a) give priority to the basic needs of the local community;
  - (b) promote the development of the local community; and
  - (c) ensure that all members of the local community have access to at least the minimum level of basic municipal services.

Further, the *Systems Act* describes the nature and manner in which service delivery must occur, namely, it must be both equitable and accessible, provided in a manner that is conducive to the prudent, efficient, effective, and economical use of the available resources and the improvements of quality standards as time progresses.<sup>1366</sup> Municipal services must also be financially and environmentally sustainable and regularly reviewed with the upgrading, improvement, and extension thereof in mind.<sup>1367</sup>

Chapter 5 of the Act is crucial insofar its provision for the preparation and adoption of Integrated Development Plans (hereafter, IDPs), of which the *WSA* requires water services development plans to be included.<sup>1368</sup> Additionally, the *Systems Act* draws a distinction between the responsibilities of a water services authority versus that of a water services provider, determines the rights, roles and duties of councillors and officials, and provides for performance management, all of which are pertinent to governing water provision in the local sphere.<sup>1369</sup>

Municipalities have the duty to include a financial plan in their IDPs, and thereby assess their capacity to deliver basic municipal services, such as water.<sup>1370</sup> In the instance where a municipality fails to prioritise and provide basic services, the court may instruct a municipality to revise its financial plan, at the insistence of the community.<sup>1371</sup> Such a revision may entail reducing municipal services in certain service areas where the service

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<sup>1366</sup> See s 73(2)(a) - (b) of the *Systems Act*.

<sup>1367</sup> See s 73(2)(c) - (e) of the *Systems Act*.

<sup>1368</sup> S 12(1) of the *WSA*.

<sup>1369</sup> Swart and Adams "Water services provision and the protection of water resources" 462.

<sup>1370</sup> The financial plan should include a budget projection for the next three years; see S 26(h) of the *Systems Act*.

<sup>1371</sup> Swart and Adams "Water services provision and the protection of water resources" 463.

levels are above the basic standard, to increase the basic service delivery in another area.<sup>1372</sup>

#### **4.3.6 The National Environmental Management Act 107 of 1998**

The *National Environmental Management Act*<sup>1373</sup> (hereafter, *NEMA*) is aimed at environmental governance, and is, therefore, instrumental as far as water, and water services is concerned. The Act provides for the overarching framework for the regulation and sustainable development and use of natural resources in the country.<sup>1374</sup> The *NEMA* acknowledges that the state must respect, promote, protect, and fulfil the social, economic, and environmental rights of everyone.<sup>1375</sup> Inequality in the distribution of resources and wealth, including the resultant poverty, are some of the notable causes and consequences of environmentally harmful practices.<sup>1376</sup> As such, the *NEMA* puts forward that everyone has the right to environmental protection, for present and future generations, through certain reasonable legislative and other measures that promote conservation, prevents pollution and ecological degradation, and that secures ecologically sustainable development and use of natural resources (such as water).<sup>1377</sup>

The *NEMA* establishes the institutional framework for the development of norms and standards, as well as the implementation of environmental legislation while also providing for enforcement and monitoring.<sup>1378</sup> The latter also applies to water laws, such as the *NWA*. The Act aims to both control and remedy environmental pollution, and in conjunction with the *NWA*, the *NEMA* proffers a strategy to regulate and control water pollution.<sup>1379</sup> This ensures the realisation of a right to access to sufficient water that is not harmful to health and wellbeing. In this way, the *NEMA* illustrates the intersection and importance of the right to the environment, health and water. Given its importance for the protection of the environment, the *NEMA* has various enforcement provisions set out

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<sup>1372</sup> Swart and Adams "Water services provision and the protection of water resources" 463.

<sup>1373</sup> The *National Environmental Management Act* 107 of 1998.

<sup>1374</sup> Swart and Adams "Water services provision and the protection of water resources" 464.

<sup>1375</sup> See the Preamble of the *NEMA*.

<sup>1376</sup> See the Preamble of the *NEMA*.

<sup>1377</sup> See the Preamble of the *NEMA*.

<sup>1378</sup> Chapters 3 – 7 of the *NEMA*. Swart and Adams "Water services provision and the protection of water resources" 464.

<sup>1379</sup> Swart and Adams "Water services provision and the protection of water resources" 464.

in sections 28 to 32, such as the very relevant duty of care and remediation of environmental damage,<sup>1380</sup> as well as access to environmental information and protection of whistle-blowers.<sup>1381</sup>

These measures ensure the prevention of significant harm to the environment and guarantee that persons who are responsible for causing environmental harm take reasonable steps to remedy any such harm. In doing so, *NEMA* contributes significantly to the protection of the country's water resources, without which water service delivery would not be possible. The Act also safeguards the provision of safe water to the community.

#### **4.3.7 The Promotion of Administrative Justice Act 3 of 2000**

The purpose of the *Promotion of Administrative Justice Act*<sup>1382</sup> (hereafter, *PAJA*) is to ensure the realisation of the right to administrative action that is lawful, reasonable, and procedurally fair. This right is vested in section 33 of the *Constitution*, which provides for just administrative action. Anyone whose rights have been adversely affected by administrative action has the right to receive written reasons. The *PAJA* plays a significant role in ensuring that everyone has access to sufficient water, particularly, water services provision. In fact, Tissington *et al*<sup>1383</sup> argue that the protection of the right of access to water is considerably bolstered by section 33(1) of the *Constitution*, and, accordingly, the *PAJA*. The authors state that *PAJA* is of particular importance in the context of the disconnection of water services.<sup>1384</sup>

The *WSA* puts forward that, in the case where water services have to be limited or discontinued, the process should be fair and equitable, and provide the user with reasonable notice of intention to limit or discontinue water services, and for an opportunity to make representations.<sup>1385</sup> Such procedures must not result in a person

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<sup>1380</sup> S 28 of the *NEMA*.

<sup>1381</sup> S 31 of the *NEMA*.

<sup>1382</sup> The *Promotion of Administrative Justice Act* 3 of 2000.

<sup>1383</sup> Tissington *et al* *Water Services Fault Lines: An Assessment of South Africa's Water and Sanitation Provision Across 15 Municipalities* 12.

<sup>1384</sup> Tissington *et al* *Water Services Fault Lines: An Assessment of South Africa's Water and Sanitation Provision Across 15 Municipalities* 12.

<sup>1385</sup> S 4(3)(a) – (b) of the *WSA*.

being denied access to water in cases where the person can prove, to the satisfaction of the water services authority, that the person is unable to afford basic water services.<sup>1386</sup> Thus, the *WSA* makes provision for aspects of procedural fairness in this regard. Nevertheless, King and Reddell<sup>1387</sup> postulate that the *PAJA* will supplement enabling legislation and fill in the gaps if any provisions are insufficiently detailed.<sup>1388</sup> To determine whether the disconnection of water services is procedurally fair, for example, one must be guided by section 3 of *PAJA*, which prescribes that an administrator must give adequate notice, a reasonable opportunity to make representations, a clear statement of what the administrative action entails, as well as adequate notice of the right to request reasons for the so-called administrative action. The *PAJA* further provides for judicial review of administrative action, the procedure for such judicial review, and remedies, amongst other issues.<sup>1389</sup>

#### **4.3.8 The Local Government: Municipal Finance Management Act 56 of 2003**

The *Local Government: Municipal Finance Management Act*<sup>1390</sup> (hereafter, the *MFMA*) provides for the sustainable management of the financial affairs of municipalities and any other institutions operating in the local government sphere.<sup>1391</sup> The *MFMA* established treasury norms and standards for reporting, budgets, and financial controls, amongst others. The Act aims to ensure accountability, transparency and appropriate lines of responsibility, and applies to all municipalities, as well as national and provincial government insofar as their financial dealings with municipalities.<sup>1392</sup> Furthermore, the *MFMA* focuses on safeguarding the management of revenues, assets, expenditures, financial dealings and liabilities.<sup>1393</sup>

Swart and Adams state that although the provisions of the *MFMA* are significant, water services authorities are advised not to regard compliance with the *MFMA* as more

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<sup>1386</sup> S 4(3) of the *WSA*.

<sup>1387</sup> King and Reddell 2015 *PELJ* 946.

<sup>1388</sup> See generally King and Reddell 2015 *PELJ* for a discussion on the *PAJA* and water use rights.

<sup>1389</sup> See ss 6 – 11 of the *PAJA*.

<sup>1390</sup> The *Local Government: Municipal Finance Management Act* 56 of 2003.

<sup>1391</sup> See the Preamble of the *MFMA*.

<sup>1392</sup> S 2 of the *MFMA*; Swart and Adams "Water services provision and the protection of water resources" 463.

<sup>1393</sup> S 2 of the *MFMA*.

important than complying with the substance of water services legislation.<sup>1394</sup> The reasoning for this statement is that, while the provisions of the *MFMA* will always be applicable to the financial management in municipalities, they should not offer procurement processes as an excuse for any non-compliance with water services legislation.<sup>1395</sup> Emergency procurement procedures may be followed to expedite procurement if the situation permits it, i.e., in the circumstances where if procurement is not expedited, it could result in the loss of life or the pollution of the environment.<sup>1396</sup>

#### **4.3.9 The Critical Infrastructure Protection Act 8 of 2019**

The *Critical Infrastructure Protection Act*<sup>1397</sup> (hereafter the *CIPA*) repealed the *National Key Points Act* 102 of 1980<sup>1398</sup> in its entirety and provides for the identification and subsequent declaration of infrastructure as critical infrastructure.<sup>1399</sup> The *CIPA* recognises that the protection of critical infrastructure is absolutely necessary to ensure public safety, national security and the continuous provision of basic public services.<sup>1400</sup> In terms of the *CIPA*, "critical infrastructure" is understood as any infrastructure which is declared as such in terms of section 20(1) of the Act and includes a "critical infrastructure complex" where required by the context.<sup>1401</sup> A "critical infrastructure complex" means more than one critical infrastructure that has been grouped together for either administrative or practical reasons, which is determined as such in section 20(1)(c) of the *CIPA*.<sup>1402</sup>

The *CIPA* has various purposes, such as securing critical infrastructure against threats; ensuring the confidentiality of information regarding critical infrastructure; safeguarding the development of objective criteria regarding the protection, identification and declaration of critical infrastructure; and providing for public-private cooperation during

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<sup>1394</sup> Swart and Adams "Water services provision and the protection of water resources" 463.

<sup>1395</sup> Swart and Adams "Water services provision and the protection of water resources" 463.

<sup>1396</sup> Swart and Adams "Water services provision and the protection of water resources" 463.

<sup>1397</sup> The *Critical Infrastructure Protection Act* 8 of 2019.

<sup>1398</sup> The *Key Points Act* designated 204 "National Key Points", the Apartheid-era equivalent of critical infrastructure with the exception of basic supply infrastructure. This list was kept confidential in terms of the *Act*, and was only made public in 2015 following a court order. The *Key Points Act* was criticised for its lack of transparency, amongst other issues; see Right2Know 2015 <http://www.r2k.org.za/2015/01/23/revealed-list-of-national-key-points/>.

<sup>1399</sup> The Preamble of the *CIPA*.

<sup>1400</sup> The Preamble and s 16 of the *CIPA*.

<sup>1401</sup> S 1 of the *CIPA*.

<sup>1402</sup> S 1 of the *CIPA*.

the identification and protection of such infrastructure.<sup>1403</sup> Furthermore, the *CIPA* purposes to:<sup>1404</sup>

secure critical infrastructure in the Republic by creating an environment in which public safety, public confidence and basic public services are promoted –

- i) through the implementation of measures aimed at securing critical infrastructures; and
- ii) by mitigating risks to critical infrastructures through assessment of vulnerabilities and the implementation of appropriate measures;

The *CIPA* promotes cooperation and a culture of shared responsibility between role-players to deal with critical infrastructure protection in an appropriate multi-disciplinary approach.<sup>1405</sup> The Act seeks to enhance the collective capacity of these role-players to mitigate possible security risks while ensuring that the relevant infrastructure complies with the regulatory measures aimed at securing it against threats.<sup>1406</sup> The *CIPA* also provides for the duties and powers of persons controlling critical infrastructure and supports the integration and coordination of the functions of various role-players involved in the securing of the infrastructure.<sup>1407</sup>

As mentioned above, critical infrastructure extends to infrastructure necessary to provide basic public services. A "basic public service" is said to include a service, whether provided by either the public or private sector, that relates to communication, energy, sanitation, health, transport and water, the interference with which may prejudice the livelihood, daily operations, well-being or economic activity of the public.<sup>1408</sup> Since water service delivery is dependent on adequate water infrastructure, the *CIPA* is significant for cities, specifically as the duty-bearers of water provision. This is because it guarantees the protection of the necessary water infrastructure and sets out the roles and responsibilities of the different role-players.

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<sup>1403</sup> S 2(a) – (d) of the *CIPA*.

<sup>1404</sup> S 2(e)(i) – (ii) of the *CIPA*.

<sup>1405</sup> S 2(f) of the *CIPA*.

<sup>1406</sup> S 2(g) – (h) of the *CIPA*.

<sup>1407</sup> S2(i) – (j) of the *CIPA*.

<sup>1408</sup> S 1 of the *CIPA*.

Arguably, the proper implementation of the *CIPA* could play an important part towards ensuring sustainable water service delivery in cities. However, by including, and thereby elevating, the provision of basic services to the more traditional imperatives of "national security", the scope of protection is very broad and may be detrimental to civilian rights. In terms of section 26 of the *CIPA*, should any disruption or obstruction of the functioning of critical infrastructure occur, it will be deemed an offence under the Act, and such interference could lead to a fine or imprisonment of up to three years, or up to ten years if the critical infrastructure was damaged.

On paper, this seems reasonable considering the requirements set out for infrastructure to be regarded as "critical" in section 16 of the *CIPA*. For instance, that infrastructure is critical if the loss, disruption, damage, or immobilisation thereof may severely prejudice the functioning of the stability of the country, the public interest in terms of safety and maintaining law and order, as well as national security.<sup>1409</sup> Yet, disruption of critical infrastructure could include peaceful yet disruptive protesting that is aimed at targeting important institutions, such as a sit-in in Parliament.<sup>1410</sup>

The latter would be protected by one's right to assembly, demonstration, picket and petition in terms of section 17 of the *Constitution*. Nevertheless, it is not certain what is meant by "...or *disrupts* a critical infrastructure..."<sup>1411</sup> in terms of the Act, and thus the *CIPA* includes both novel, but potentially worrying rules. A more relevant example may be if a person takes a "selfie" at a dam, in which some of the security measures appear in the background of the photo.<sup>1412</sup> This would amount to an offence in terms of the *CIPA*,<sup>1413</sup> regardless of whether the action of taking the selfie *actually* caused any harm to the critical infrastructure. Consequently, one may conclude that although the *CIPA* makes a necessary contribution in terms of the protection of water infrastructure, it is

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<sup>1409</sup> S 16(1)(b)(i) – (iii) of the *CIPA*.

<sup>1410</sup> See Right2Know 2017 <http://www.r2k.org.za/2017/11/13/r2k-briefing-critical-infrastructure-protection-bill/>.

<sup>1411</sup> Own emphasis added, see s 26(1)(g) of the *CIPA*.

<sup>1412</sup> The *CIPA* states that "security measures" includes any such measures at critical infrastructure that are not clearly visible to the public or in the public domain; see s 26(2) of the *CIPA*.

<sup>1413</sup> See s 26(1)(b) of the *CIPA*.



weighed against the potential legal difficulties involved, particularly regarding what is considered an offence in terms of the Act.

#### **4.3.10 The Strategic Framework for Water Services 2003**

As with the White Paper,<sup>1414</sup> the SFWS represents a major policy shift in the water provision paradigm, and the context of its adoption, much like with the White Paper, is important towards understanding what the SFWS proposed to contribute to the policy framework on water services. The SFWS, also known as the "umbrella framework" for the water services sector at the dawn of the millennium in South Africa, aimed to set out the national framework for the water services sector.<sup>1415</sup> Specifically, the SFWS's goal was to inform the development of detailed strategies to give effect to the framework.<sup>1416</sup> Its purpose was to establish a vision for the water services sector in the country for the following ten years, and to set out a water services framework that will allow the sector vision to be attained (namely, to provide basic water and sanitation services to everyone).<sup>1417</sup>

The SFWS acknowledges that upon its adoption, it has been eight years since the White Paper was published.<sup>1418</sup> The White Paper played an integral role in creating an enabling policy framework, but the SFWS represents many differences compared to the White Paper. For instance, more emphasis is placed on sustainability, financial viability and efficiency.<sup>1419</sup> These differences may be attributed to the various political and institutional shifts that took place in the country during the eight years after the White Paper, such as the local government transformation process which now allows local government to assume full responsibility for the provision of water and sanitation services.<sup>1420</sup> The SFWS represented a new phase in the long process of building local democracy, since it stated that, new municipalities have now been established, and thus it is time to shift the focus

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<sup>1414</sup> See para 4.3.1 above.

<sup>1415</sup> The SFWS 3.

<sup>1416</sup> The SFWS 3.

<sup>1417</sup> The SFWS 3.

<sup>1418</sup> The SFWS 2.

<sup>1419</sup> The SFWS 3.

<sup>1420</sup> The SFWS 2.

to ensure that they fulfil their role as water service authorities by providing people with efficient, effective, and affordable water services.<sup>1421</sup>

In 2015, Swart and Adams postulated that although the Framework stated that it is to be achieved within five years, at the time of the authors commenting on the SFWS, all three spheres of government were still engaged in working to achieve the objective of delivering basic water services to everyone.<sup>1422</sup> This does not, however, mean that cities should strive to provide *only* a basic level of water services to persons.<sup>1423</sup> In conjunction with the latter, the SFWS introduced the "water ladder", which encourages municipalities to progressively improve water services provision, to safeguard a continued level of acceptable services.<sup>1424</sup>

The introduction of the "water ladder", in addition to the SFWS's focus on the sustainability of water services are arguably the two most significant contributions made by the Framework. In terms of the water ladder, the SFWS recognised that the first step is to provide basic services to all living people in South Africa and that government must commit funds to ensure its realisation.<sup>1425</sup> Succeeding this, is providing an "intermediate" level of service, such as a tap in the yard of a water user, following which higher levels of services should ensue.<sup>1426</sup> Water services authorities are expected to help communities achieve intermediate and higher levels of services, insofar it is practical, affordable and sustainable, without compromising the national policy priority of universal access to, at the minimum, a basic level of water services.<sup>1427</sup>

The SFWS stated that, as far as sustainability is concerned, access to a tap is redundant if the water stops flowing or the tap stops working.<sup>1428</sup> It, therefore, highlights the need for water services authorities to prioritise sustainable water service provision, in addition to ensuring that services are affordable. Here, the SFWS states that the provision of free

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<sup>1421</sup> The SFWS 2.

<sup>1422</sup> Swart and Adams "Water services provision and the protection of water resources" 459.

<sup>1423</sup> Swart and Adams "Water services provision and the protection of water resources" 459.

<sup>1424</sup> The SFWS ii.

<sup>1425</sup> The SFWS ii.

<sup>1426</sup> The SFWS ii.

<sup>1427</sup> The SFWS ii.

<sup>1428</sup> The SFWS ii.

basic water via the *Free Basic Water Implementation Strategy* is essential, but that it becomes the responsibility of the community to not abuse the system by making use thereof while actually being able to afford water services.<sup>1429</sup> The Framework emphasised that communities should pay for services if they are provided beyond the free basic allocation, since the accrual of locally sourced revenue is pertinent for water services authorities to erect, maintain and operate water infrastructure.<sup>1430</sup> In doing so, sustainable water services may become a reality. Therefore, arguably, the "water ladder" and the sustainability of water services are interrelated. This linkage is central to ensuring the eventual realisation of the constitutional water right.

#### **4.3.11 The Framework for a Municipal Indigent Policy (2005)**

The *Framework for a Municipal Indigent Policy* (2005) aimed to set out a high-level framework to guide the national drive to improve the lives of indigent persons.<sup>1431</sup> The general objective of the framework was to eradicate those elements of poverty over which municipalities have control, namely, aspects of service delivery.<sup>1432</sup> Accordingly, the framework set the goal to provide all indigent persons with access to free basic water supply, sanitation, refuse services, and energy services by 2012.<sup>1433</sup> Given the current state of access to water services in the country,<sup>1434</sup> this lofty goal was, arguably, not attained. However, the policy that the framework established at least attempted to address the problem of institutional exclusion by facilitating the reform of the systems of local government in ways that safeguard the inclusion of the poor in ways that will ensure their access to affordable and basic services.

The relevant framework describes "indigent" as lacking the necessities of life, which generally include the goods and services necessary for an individual to survive, such as

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<sup>1429</sup> The SFWS ii.

<sup>1430</sup> The SFWS ii.

<sup>1431</sup> *Framework for a Municipal Indigent Policy* (2005) 1. For an analysis of the country's free basic services, see generally Tissington *Targeting the Poor? An Analysis of Free Basic Services (FBS) and Municipal Indigent Policies in South Africa*.

<sup>1432</sup> *Framework for a Municipal Indigent Policy* (2005) 3.

<sup>1433</sup> *Framework for a Municipal Indigent Policy* (2005) 3.

<sup>1434</sup> See para 3.2 above.

sufficient water.<sup>1435</sup> The provision of free basic water supply is in the purview of local governments.<sup>1436</sup> As such, the *Framework for a Municipal Indigent Policy* (2005), in this regard, raises the issue of maintaining access to the free basic services provided. It is said that if the services required by the indigent are not properly operating or are not maintained properly, they may become dysfunctional and would, once again, leave indigent persons without effective access to such services.<sup>1437</sup> The concept of "institutional poverty" becomes relevant in this context since, where there already exists a substantial lack of financial and human resources in local governments, significant portions of the populations in such municipalities will remain indigent.<sup>1438</sup>

Therefore, municipalities must ensure that sufficient financial resources are available to ensure the *sustainability* of free services, such as free basic water services, to indigent persons. This means that the municipality must be able to, at the minimum, have the infrastructure necessary to supply 25 litres of *potable water* per person per day.<sup>1439</sup> This volume must be provided within 200 metres of a household and with a minimum flow rate of ten litres per minute where communal water points are concerned.<sup>1440</sup> This amounts to 6000 litres of potable water supplied per *formal connection* per month in the case of either yard or home connections.<sup>1441</sup>

Due to the financial resources involved in providing free basic services to indigent persons, the Framework stated that it would not be possible to apply a sound indigent policy lacking a proper system for identifying consumer units and billing water users who receive water units above the free basic water level.<sup>1442</sup> This includes making sure that payments are made via a sound credit control system. Without such mechanisms in place,

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<sup>1435</sup> The *Framework for a Municipal Indigent Policy* (2005) 9; see also Tissington *Targeting the Poor? An Analysis of Free Basic Services (FBS) and Municipal Indigent Policies in South Africa* 31.

<sup>1436</sup> The *Framework for a Municipal Indigent Policy* (2005) 10.

<sup>1437</sup> See the *Framework for a Municipal Indigent Policy* (2005) 16.

<sup>1438</sup> The *Framework for a Municipal Indigent Policy* (2005) 16.

<sup>1439</sup> The *Framework for a Municipal Indigent Policy* (2005) 17.

<sup>1440</sup> The *Framework for a Municipal Indigent Policy* (2005) 17.

<sup>1441</sup> The *Framework for a Municipal Indigent Policy* (2005) 17.

<sup>1442</sup> The *Framework for a Municipal Indigent Policy* (2005) 24.

municipalities run the real risk of non-indigent persons receiving subsidised services, and using resources that would otherwise have benefitted indigent persons.<sup>1443</sup>

#### **4.3.12 The Free Basic Water Implementation Strategy 2007**

As the name suggests, the primary goal of the *Free Basic Water Implementation Strategy* (2007) is to provide content to the provision of a free basic level of service to alleviate poverty in South Africa. The *Free Basic Water Implementation Strategy* is the fourth version of the Strategy.<sup>1444</sup> The adoption of this strategy aided significantly in establishing water as both a social and economic good that must be used sustainably.

This Strategy gives recognition to nuanced realities, such as that water issues are distinct in different categories of district and local municipalities. While the 2007 *Free Basic Water Implementation Strategy* acknowledges that much of the responsibility for delivering free basic water services lies with the local sphere of government, it encourages such local governments to operate in a context that allows them to effectively provide subsidised services to communities. The latter entails including appropriate national subsidy agreements and receiving support and guidance from other spheres of government.

The free basic water allocation remains 25 litres per person per day, or 6000 kilolitres per household per month.<sup>1445</sup> However, both literature and the 2007 *Free Basic Water Implementation Strategy* recognise the shortages that this basic water supply amounts to.<sup>1446</sup> For instance, the basic amount of water that is allocated to a person per day is not sufficient for consumer units that utilise flushing toilets. In such cases, the volume of water should be approximately 35 – 40 litres to allow one to enjoy the benefits intended by the free basic water strategy.<sup>1447</sup> Additional concerns include that the current free basic

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<sup>1443</sup> The *Framework for a Municipal Indigent Policy* (2005) 24.

<sup>1444</sup> See generally Muller 2008 *Environment & Urbanisation*; Gowlland-Gualtieri *South Africa's Water Law and Policy Framework: Implications for the Right to Water* 5; Swart and Adams "Water services provision and the protection of water resources" 459 – 460.

<sup>1445</sup> The *Free Basic Water Implementation Strategy* 2007 5.

<sup>1446</sup> See Muller 2008 *Environment & Urbanization* 81; The *Free Basic Water Implementation Strategy* of 2007 5.

<sup>1447</sup> The *Free Basic Water Implementation Strategy* 2007 5.

water allocation does not cater for the needs of larger households or households with members who have a disability.

The 2007 Strategy recognises that while many persons who already have access to a water service point have received access to the free basic water allocation, it is worrisome that many communities and households still do not have access to water infrastructure.<sup>1448</sup> Conversely, the focus on providing water to the unserved in the last couple of decades has, to a certain extent, unintentionally led to the underinvestment, maintenance and refurbishment of existing infrastructure, often rendering it out of order.<sup>1449</sup> In both such cases, persons cannot benefit from the free basic supply of water. Ensuring that such persons have access to the necessary infrastructure, on the other hand, is costly. Locally raised revenue, i.e., money obtained from water tariffs, is integral to maintain the financing of services.<sup>1450</sup> It is not always possible for water services authorities in rural areas to wholly rely on locally raised revenue, and as such, they increasingly rely on national transfers.<sup>1451</sup>

As indicated by Swart and Adams,<sup>1452</sup> free basic water services should be financed from the local government's equitable share. This is a constitutionally required portion of the national annual budget allocated to local government, in addition to cross-subsidisation between users in a system of supply, or where appropriate, a water services authority.<sup>1453</sup> According to the *Free Basic Water Implementation Strategy*, an increase in the equitable share allocation will be the most direct contribution to the free basic water challenge.<sup>1454</sup> However, Swart and Adams continue to emphasise that the rising block tariff system that municipalities have to adopt is crucial for the financial sustainability of the delivery of free basic water.<sup>1455</sup>

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<sup>1448</sup> The *Free Basic Water Implementation Strategy* 2007 6.

<sup>1449</sup> The *Free Basic Water Implementation Strategy* 2007 15.

<sup>1450</sup> The *Free Basic Water Implementation Strategy* 2007 31.

<sup>1451</sup> The *Free Basic Water Implementation Strategy* 2007 31.

<sup>1452</sup> Swart and Adams "Water services provision and the protection of water resources" 460.

<sup>1453</sup> Swart and Adams "Water services provision and the protection of water resources" 460.

<sup>1454</sup> *Free Basic Water Implementation Strategy* 2007 31 – 32.

<sup>1455</sup> Swart and Adams "Water services provision and the protection of water resources" 460.

### **4.3.13 The National Water Resource Strategy 2013**

The *NWRS* aims to provide for a long-lasting way forward towards attaining water security, sustainability and national priorities.<sup>1456</sup> It is binding on all authorities and institutions implementing the *NWA*.<sup>1457</sup> The Strategy explains how water could support development, the elimination of inequality and poverty, how water is protected, used, conserved, managed and controlled equitably.<sup>1458</sup> Primarily, the Strategy focuses on sustainable and equitable access to water resources. The *NWRS* further aims to ensure that South Africa's water resources are managed towards achieving the country's growth, socio-economic and growth priorities in a manner that is both sustainable and equitable over the next five to ten years.<sup>1459</sup>

The main focus of the *NWRS* is to ensure equitable and sustainable access and use of water by all South Africans while sustaining our water resources.<sup>1460</sup> The Strategy indicates the dire need for securing water security and healthy water ecosystems that support our national imperatives. To this end, the *NWRS* highlights that various "Reconciliation Strategies" have been developed to assess the current water balance against future needs.<sup>1461</sup> These Strategies are aimed to regulate the country's water resource management, as well as resource planning and investment.<sup>1462</sup> The *NWRS* stresses key issues, specifically, guaranteeing greater focus on water conservation and water demand management, since "every drop counts and we cannot afford to lose any more water, anywhere".<sup>1463</sup>

The Strategy is required by section 5 of the *NWA* and provides strategic direction for water resource management in the country for the subsequent 20 years, with a focus on certain priorities and goals for the period of 2013 – 2017.<sup>1464</sup> The *NWRS* provides for the

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<sup>1456</sup> The contents of the strategy aim to respond to the *NDP* so as to enable South Africa to achieve its vision for 2030; see the *NWRS* 1.

<sup>1457</sup> The *NWRS* 1.

<sup>1458</sup> Masindi and Dunker 2016 *CSIR* 5.

<sup>1459</sup> The *NWRS* 1.

<sup>1460</sup> For an in-depth analysis of the *NWRS*, see generally Meissner 2016 *Water SA*.

<sup>1461</sup> The *NWRS* ii.

<sup>1462</sup> The *NWRS* ii – iii.

<sup>1463</sup> The *NWRS* ii.

<sup>1464</sup> Swart and Adams "Water services provision and the protection of water resources" 457.

framework that promotes the protection, conservation, use, development, control and management of water resources.<sup>1465</sup> It also established the framework within which water has to be managed at catchment level, and defined water management areas.<sup>1466</sup>

Of particular relevance to this study, the *NWRS* provides content on infrastructure development and management, and put forward the development and maintenance of a "National Infrastructure Investment Framework"; stresses the need for asset management plans; the transfer of water resource infrastructure to the organ of state that is most capable of managing it; as well as the rehabilitation of infrastructure.<sup>1467</sup> Furthermore, the Strategy discusses water conservation and demand management in local government, as well as implementing water resource infrastructure development in the context of water conservation and demand management, focusing on leak repairs, monitoring and information management, and research an innovation in the water sector.<sup>1468</sup>

Arguably, part of the significance of the *NWRS* as it relates to water service provision lies in the fact that the Strategy emphasises that it is necessary for municipalities to consider that any development taking place in its area must take into consideration the availability of water.<sup>1469</sup> The *NWRS* is, therefore, strongly linked with water services provision, given its focus on the protection and conservation of water resources which ensures water availability necessary for the realisation of access to basic water supplies. This is where it becomes essential for development plans, such as integrated development plans which must include water services development plans, to be aligned with the provisions of the *NWRS*. This is particularly vital since the *NWRS* is founded on the recognition that water is a basic human need and that it plays a critical role in ensuring equitable socio-economic development.<sup>1470</sup>

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<sup>1465</sup> Swart and Adams "Water services provision and the protection of water resources" 457.

<sup>1466</sup> See Chapter 8 of the *NWRS*.

<sup>1467</sup> See Chapter 4 of the *NWRS*.

<sup>1468</sup> See Chapter 7, 13 and 14 respectively of the *NWRS*.

<sup>1469</sup> Swart and Adams "Water services provision and the protection of water resources" 458.

<sup>1470</sup> Swart and Adams "Water services provision and the protection of water resources" 458.



#### **4.3.14 The National Development Plan 2030 (2015)**

The *NDP* recognises that South Africa is a water-scarce country, and therefore addresses the water issue several times in its text, whilst determining that greater attention must be paid to sustainable water resource management and use.<sup>1471</sup> The *NDP* specifically states that managing water resources sustainably involves the effective administration of water resources; evolving the water management approaches utilised; and the prioritisation of water resource management strategies.<sup>1472</sup>

It holds that an enabling milestone for South Africa is to ensure that everyone has access to clean, running water in their homes.<sup>1473</sup> Furthermore, the *NDP* states that a critical action is public infrastructure investment, at ten percent of the gross domestic product, which will be financed by means of taxes, tariffs, public-private partnerships and loans, focused on transport, water and energy. Moreover, it includes water as part of the strategic approach to establishing a minimum standard of living for South African persons.<sup>1474</sup> The *NDP* further suggests that more competitive and efficient infrastructure must be developed to strengthen key services such as water, whilst maintaining its sustainability and affordability.<sup>1475</sup>

Additionally, it recognises the objective that all people should have access to clean, potable water whilst ensuring that there is sufficient water for agriculture and industry. At the same time, another *NDP* objective is to reduce water demand in urban areas to 15% below the current rate by 2030. Moreover, it recognises the challenges urbanisation poses, and holds that by 2030, another 7.8 million people will be residing in South African cities.<sup>1476</sup> Consequently, the *NDP* stresses the need for innovative approaches to address

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<sup>1471</sup> *NDP* 177.

<sup>1472</sup> *NDP* 178.

<sup>1473</sup> *NDP* 34.

<sup>1474</sup> This approach is centred on the key capabilities that individuals require in order to live the life they desire; *NDP* 38.

<sup>1475</sup> *NDP* 40.

<sup>1476</sup> *NDP* 266.

the country's biggest problems, and that innovation is necessary for a middle-income country to develop.<sup>1477</sup> This includes focusing on scientific and technological advances.<sup>1478</sup>

#### ***4.3.15 The National Water Research, Development and Innovation Roadmap 2015 – 2025 (2015)***

The RDI Roadmap aims to set out a structured framework to focus the country's contribution in terms of research, development, and innovation to implement national strategies, policies, and planning, particularly in the water sector. The RDI Roadmap envisions that South Africa becomes a leader amongst middle-income countries in developing and deploying both water management practices and technologies and competes with leading countries in providing sustainable solutions to water-related issues.<sup>1479</sup> As a high-level planning tool, the RDI Roadmap seeks to facilitate and guide the refocusing of research, synergising current initiatives, reprioritising funds, and ring-fencing new resources towards a more optimal water innovation system.<sup>1480</sup> Given its direct relevance to the issues analysed in this study, greater focus will be placed on this roadmap in the next section.<sup>1481</sup>

#### ***4.3.16 The National Water and Sanitation Master Plan 2016***

The *Master Plan* is a complex document consisting of three volumes, each representing a different phase in the plan's implementation. Volume 1 of the *Master Plan* is the "Call to Action", which serves as the executive summary of the *Master Plan*, and broadly outlines the current challenges and proposed solutions. In this volume, only the overall strategic key actions and interventions are included.<sup>1482</sup> Volume 2 is the "Plan to Action" phase and motivates in greater detail the challenges faced by the water sector, as well as why it is necessary to implement specific interventions and actions.<sup>1483</sup> Furthermore, Volume 2 provides an outline of the key actions under each section and summarises these

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<sup>1477</sup> NDP 33.

<sup>1478</sup> NDP 33.

<sup>1479</sup> RDI Roadmap i.

<sup>1480</sup> RDI Roadmap i.

<sup>1481</sup> See para 4.4 below.

<sup>1482</sup> Volume 1 of the *Master Plan* 3.

<sup>1483</sup> Volume 1 of the *Master Plan* 3.

actions at the end.<sup>1484</sup> Finally, Volume 3 entails the "Schedule of Actions" and may be seen as the core deliverable of the *Master Plan*.<sup>1485</sup>

The *Master Plan* states that in order to build a water-secure future, it is based on five key objectives that define a "new normal" for water and sanitation in the country.<sup>1486</sup> These five key objectives include, resilient and fit-for-use water supply; universal water and sanitation provision; reduction in future water demand; equitable allocation and sharing of water resources; as well as effective infrastructure management, operation and maintenance.<sup>1487</sup> It is said that these five objectives enable the vision expressed in the *NDP* for 2030, which entails reliable and affordable access to sufficient and safe water and sanitation for well-being, socio-economic growth, and with due regard for the environment.<sup>1488</sup>

The *Master Plan* then states that achieving water security in the country requires a new normal and a big paradigm shift that recognises, for instance, the limitations of water availability, addresses the real value of water, delivers reliable water services to all, ensures equitable access to limited resources, and focuses on demand management and alternative water sources.<sup>1489</sup> From this, the Plan surmises the following "new reality", namely that water will become more expensive, that everyone (except persons without piped water) must use less water for the same activities, and that everyone, to the exclusion of indigent persons, must pay for water and sanitation services.<sup>1490</sup> This new reality has a strong focus on addressing the non-payment of water services, and to a lesser extent reducing water use.<sup>1491</sup> The *Master Plan* does, subsequently, pay significant attention to the high water demand by water users, as well as the issue of non-revenue water.<sup>1492</sup>

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<sup>1484</sup> Volume 1 of the *Master Plan* 3.

<sup>1485</sup> Volume 1 of the *Master Plan* 3.

<sup>1486</sup> Volume 1 of the *Master Plan* 7.

<sup>1487</sup> Volume 1 of the *Master Plan* 7.

<sup>1488</sup> Volume 1 of the *Master Plan* 7.

<sup>1489</sup> Volume 1 of the *Master Plan* 8.

<sup>1490</sup> Volume 1 of the *Master Plan* 8.

<sup>1491</sup> Volume 1 of the *Master Plan* 8.

<sup>1492</sup> See Section 1: Water and Sanitation Management in Volume 1 of the *Master Plan*.

It indicates that the gap between current and future water requirements and the actual supply is driven by factors such as low tariffs, inadequate cost recovery, over-consumption, inefficient use, wastage, inappropriate infrastructure choices, leakage, population and economic growth, as well as inadequate planning and implementation.<sup>1493</sup> From the previous sections of this study, one is able to concur with the drivers identified above.<sup>1494</sup> Considering the extent of the *Master Plan* only the aspects that are pertinent to the water service delivery challenges discussed in this study will be analysed in the following section.<sup>1495</sup>

#### **4.3.17 National Climate Change Adaptation Strategy 2020**

The *National Climate Change Adaptation Strategy* (hereafter, the NCCAS) of 2020 sets out a common vision of climate change adaptation and climate resilience for South Africa, and outlines certain priority areas for achieving this vision.<sup>1496</sup> Climate change is understood as referring to a change in the state of the climate that can be identified by alterations in the mean or the variability of its properties, and that persists for extended periods of time, often decades or longer.<sup>1497</sup> Climate change is resultant from natural internal processes or external forces, including modulations of solar cycles, constant anthropogenic changes in the atmospheric composition or in land use, and volcanic eruptions.<sup>1498</sup>

In line with its focus on adaptation, the NCCAS defines adaptation as the process of adjustment to either actual or expected climate and the effects thereof.<sup>1499</sup> As far as human systems are concerned, adaptation aims to moderate or avoid harm or exploit beneficial opportunities.<sup>1500</sup> Conversely, in natural systems, human intervention may aid adjustment to expected climate and its effects.<sup>1501</sup>

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<sup>1493</sup> See Volume 1 of the *Master Plan* 12.

<sup>1494</sup> See Chapter 3 above.

<sup>1495</sup> See para 4.4 below.

<sup>1496</sup> The NCCAS 9.

<sup>1497</sup> The NCCAS 3.

<sup>1498</sup> The NCCAS 3.

<sup>1499</sup> The NCCAS 3.

<sup>1500</sup> The NCCAS 3.

<sup>1501</sup> The NCCAS 3.

The NCCAS states that adaptation to climate change provides an opportunity to the country to transform both the health and the economy, to become more competitive in global markets, and to strengthen the social and spatial fabric.<sup>1502</sup> To achieve this, systemic changes are also required to minimise the consequences of climate change.<sup>1503</sup> Technological advancements that take social and economic factors into account are proffered as a means to assist in making these transformative changes.<sup>1504</sup>

For the water sector in particular, this is an important strategy, since the country is experiencing observable effects of climate change resultant from, for example, rising temperatures and rainfall variability.<sup>1505</sup> Inevitably, climate change has a bearing on the ability of municipalities to provide water services, because of the effect climate change has on water resources and the availability thereof, as well as infrastructure.<sup>1506</sup> The NCCAS identifies water, amongst others, as a priority adaptation-related sector and emphasises that the strategy applies to municipalities.<sup>1507</sup>

It further states that climate change adaptation responses are being implemented by different spheres of government as well as other sectors, such as research and business institutions.<sup>1508</sup> However, many critical actions that are required fall within the duties of municipalities. These include the provision of basic services, including water, and see to issues such as disaster risk management and the provision of healthy and safe human settlements.<sup>1509</sup>

#### **4.4 The South African legislative response to specific city-level water service delivery challenges**

The above section is illustrative of the broad legal framework governing water service provision in the country. However, and as per the focus of this study, issues, or challenges

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<sup>1502</sup> The NCCAS 9.

<sup>1503</sup> The NCCAS 9.

<sup>1504</sup> The NCCAS 9.

<sup>1505</sup> The NCCAS 9.

<sup>1506</sup> The NCCAS 13. See also the vulnerability assessment of the water resources sector in the NCCAS 19.

<sup>1507</sup> The NCCAS 10. The NCCAS provides a map that illustrates the estimated future water supply vulnerability for local municipalities. This map is indicative of the dire situation the country faces in terms of water demand versus available supply; see the NCCAS 14.

<sup>1508</sup> The NCCAS 49.

<sup>1509</sup> The NCCAS 49.

in relation to water service provision persist and remain mostly unresolved. As Du Plessis posits, despite the various related constitutional rights, law and policymakers, lawyers, planners, natural scientists, government officials, citizen groups *inter alia* have to work together to make a concerted effort to move forward in providing normative content to South Africa's constitutional water right.<sup>1510</sup> Even so, Du Plessis further states that the law is neither the sole nor the primary source of answers for water access related issues.<sup>1511</sup>

The law, however, serves as a valuable and necessary tool for finding answers to these issues. Given this, the current section seeks to determine how, if at all, specific city-level water service delivery challenges, namely, non-revenue water, illegal water use, insufficient data, and the sustainability of water services, are regulated by the national law and policy framework discussed in the previous section. To this end, the potential may arise for recommendations or comments to be made concerning possible areas of development or concern regarding the country's water laws.

#### **4.4.1 Non-revenue water**

Upon the analysis of the abovementioned legislative instruments, several were found to relay specific duties to municipalities regarding the challenge of non-revenue water. These instruments include the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*; the *Norms and Standards in Respect of Tariffs for Water Services*; the *Structures Act*; the *Systems Act*; the SFWS; the *Free Basic Water Implementation Strategy*; the *NWRS*; the RDI Roadmap; and the *Master Plan*. These instruments and the duties provided within them in relation to non-revenue water will be discussed below, each in turn.

The first legal instrument relevant to the challenge of non-revenue water is the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*<sup>1512</sup> that have been determined under sections 9(1) and 73(l)(j) of the *WSA*. These regulations are of specific relevance, given the requirement established for water services

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<sup>1510</sup> Du Plessis 2010 *RECIEL* 326 – 327.

<sup>1511</sup> Du Plessis 2010 *RECIEL* 326.

<sup>1512</sup> *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

authorities to include a water services audit in its annual report on the implementation of its water services development plan,<sup>1513</sup> as well as the content ascribed to the determination of water losses.<sup>1514</sup> The latter are specifically interrelated in the context of the determination of non-revenue water, illegal water connections, obtaining accurate data concerning water services provision, and also plays a role in the sustainability of water service provision.

As per regulation 10(2), a water services audit must contain details regarding the previous financial year, and, if available, the comparative figures of the two preceding financial years on, for instance, the quantity of water services provided and used by each user sector, and the quantity of water provided to the water services institution by a different water services institution.<sup>1515</sup> Furthermore, a water services authority must provide figures on the levels of services rendered, including, for example, the number of user connections in every user sector, the number of households that have been provided with water via communal water services works, and the number of new water supply connections made.<sup>1516</sup> The water services audit must also include figures regarding cost recovery, including information on the tariff structures for each user sector, the income collected expressed as a percentage of total costs for the water services provided, as well as any unrecovered charges expressed as a percentage of total costs for water services delivered.<sup>1517</sup>

As meter installation and meter testing is concerned, figures must be provided about the number of new meters that have been installed at consumer installations, as well as the number of meters tested and replaced.<sup>1518</sup> The latter must be expressed as a percentage

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<sup>1513</sup> This is also required under s 18(1) of the *WSA*; see also reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1514</sup> Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1515</sup> Reg 10(2)(a)(i) - (ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1516</sup> Reg 10(2)(b)(i), (ii), and (vi) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1517</sup> See Reg 10(2)(d)(i) – (iii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1518</sup> Reg 10(2)(e)(i) – (ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

of the total number of meters installed at consumer connections. Arguably, this is especially essential for municipalities to determine potential illegal connections. The regulations also stipulate that all meters must comply with the *Trade Metrology Act*,<sup>1519</sup> specifically if it is of a size regulated under this Act.

Regulations that are vital for determining non-revenue water in municipalities may be found in regulation 10(g). These regulations prescribe that details must be stated in the water audit on the water conservation and demand management of a municipality.<sup>1520</sup> These details should include, at the least, the results of the water balance as determined in regulation 11, the total quantity of unaccounted for water, the demand management activities that have been undertaken, as well as the progress made towards the installation of water-efficient devices.<sup>1521</sup>

In terms of regulation 11, a water services institution must measure the quantity of water provided to each supply zone within its supply area, and determine the quantity of unaccounted for water by comparing the measured quantity of water provided to each supply zone with the total measured quantity of water provided to all user connections within that supply zone.<sup>1522</sup> Moreover, a water services institution is then expected to take steps to reduce the amount of unaccounted-for water.<sup>1523</sup> Regulation 12 continues by determining that a water services institution must repair any major, visible, or reported leaks in its water services system within 48 hours of becoming aware thereof.<sup>1524</sup>

The Regulations at hand explicitly state that a water services institution must have a consumer service in place where the non-compliance to these regulations may be

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<sup>1519</sup> Reg 13(3) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1520</sup> Reg 10(g) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1521</sup> Reg 10(g)(i) – (iv) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1522</sup> Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1523</sup> Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1524</sup> Reg 12 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.



reported.<sup>1525</sup> Given the difficult challenges experienced by municipalities as discussed above,<sup>1526</sup> it is questionable to what extent these regulations are followed, and whether proper reporting mechanisms are in place. An analysis of this kind regarding three specific cities will follow below in a later section of this chapter.<sup>1527</sup>

Tariffing is an essential component of the non-revenue water discussion since it allows for the cost recovery for both the water and services provided. As per the *National Norms and Standards for Domestic Water and Sanitation Services*, generally, it is agreed that determining an appropriate fee for a natural resource such as water may act as an effective mechanism to attain its productive and efficient use.<sup>1528</sup> It remains the responsibility of water services authorities to ensure that there are systems in place to ensure the efficient, effective, and timely collection of all revenue due.<sup>1529</sup> The costs pertaining to refining, establishing and aligning the evaluation and monitoring efforts by the municipality must be factored in to the tariffs, and this applies to the management and analysis of all relevant data as well.<sup>1530</sup> In terms of the *Norms and Standards in Respect of Tariffs for Water Services*, a water services institution may charge any consumer that is connected through a water services work without the authorisation of the relevant water services institution, a connection fee for upgrading the unauthorised connection, regardless of any other action the water services institution may institute against the consumer.<sup>1531</sup>

Next, as per the *Structures Act*, the executive committee of the municipality must review the performance of the municipality with a view to improve, amongst other issues, the efficiency of credit control, revenue and debt collection services.<sup>1532</sup> Following this, the

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<sup>1525</sup> See reg 16 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1526</sup> See chapter 3 above.

<sup>1527</sup> See para 4.5 below.

<sup>1528</sup> *National Norms and Standards for Domestic Water and Sanitation Services* GN R982 in GG 41100 of 8 September 2017 17 – 18.

<sup>1529</sup> *National Norms and Standards for Domestic Water and Sanitation Services* GN R982 in GG 41100 of 8 September 2017 17 – 18.

<sup>1530</sup> *National Norms and Standards for Domestic Water and Sanitation Services* GN R982 in GG 41100 of 8 September 2017 17 – 18.

<sup>1531</sup> Reg 10 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1532</sup> S 44(3)(b)(ii) of the *Structures Act*.

committee must report to the municipal council on all decisions made by the committee.<sup>1533</sup> In turn, the executive mayor of a municipality must also review the performance of a municipality to improve the efficiency of credit control and revenue and debt collection services.<sup>1534</sup>

The *Systems Act* prescribes that a municipality must adopt, implement and maintain a credit control and debt collection policy that provides for matters relating to unauthorised consumption of services, damages, and theft, among others.<sup>1535</sup> A municipal council must, in turn, adopt bylaws that give effect to the latter policy, including its implementation and enforcement.<sup>1536</sup> Establishing such policies and bylaws may be considered integral towards addressing non-revenue water in municipalities, specifically the unauthorised consumption aspect thereof.<sup>1537</sup> Furthermore, in relation to the levying of taxes and rates by municipalities and the charging of fees for municipal services, municipalities must, within their administrative and financial capacity take reasonable steps to safeguard that the consumption by individual consumers is measured through both accurate and verifiable means.<sup>1538</sup> This duty may be considered central to curbing non-revenue water in cities.

In the SFWS, it is observed that poor revenue collection, downward pressure concerning retail water tariffs, and increasing input costs are causing financial strain for many water services providers and are resulting in inadequate spending on maintenance and rehabilitation.<sup>1539</sup> Furthermore, it is noted that in most municipal services providers, the physical functions of services provision are separated from revenue management, which hinders the effective management of both consumers and revenue.<sup>1540</sup> Due to this, the SFWS suggests certain reform objectives that include improving the financial sustainability and viability of the water service provision sector by noticeably improving

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<sup>1533</sup> S 44(4) of the *Structures Act*.

<sup>1534</sup> S 56(3)(c)(ii) of the *Structures Act*.

<sup>1535</sup> S 96b), 97(1)(h), 97(2), 98(1) of the *Systems Act*.

<sup>1536</sup> S 98(1) of the *Systems Act*.

<sup>1537</sup> See para 4.4.2 below.

<sup>1538</sup> S 95(d) of the *Systems Act*.

<sup>1539</sup> The SFWS 14.

<sup>1540</sup> The SFWS 14.

revenue collection and improving consumer management.<sup>1541</sup> The SFWS also suggests improving accountability of water services providers, as well as enhancing the efficiency of water use through appropriate water demand management and conservation measures.<sup>1542</sup>

The SFWS requires that water services authorities develop retail water and sanitation tariff policies. These policies must include certain requirements, such as accounting for the costs of system expansion and rehabilitation.<sup>1543</sup> This contributes to another requirement, namely that water losses and water that is unaccounted must be managed to be within acceptable levels.<sup>1544</sup> The requirement that the allocation of funds for maintenance should be sufficient to adequately maintain the relevant water services infrastructure and related systems also underpins the need for minimising water losses.<sup>1545</sup>

Finally, in terms of the SFWS, it is deemed necessary for water services institutions to develop an appropriate water conservation and demand management strategy.<sup>1546</sup> Such strategies that have been developed by water services authorities must be included in their water services development plans.<sup>1547</sup> Water conservation and demand management strategies should, however, be based on certain principles that include requiring water institutions to strive to minimise water losses and promote water demand management to their consumers.<sup>1548</sup>

The *Free Basic Water Implementation Strategy* of 2007 addresses non-revenue water by stating that local authorities must reduce costs through appropriate infrastructure standards and the management of water losses.<sup>1549</sup> This is integral towards securing the capacity of a municipality to provide free basic water provision to the community.<sup>1550</sup> The

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<sup>1541</sup> The SFWS 15.

<sup>1542</sup> The SFWS 15.

<sup>1543</sup> The SFWS 34.

<sup>1544</sup> The SFWS 34.

<sup>1545</sup> The SFWS 34.

<sup>1546</sup> The SFWS 44.

<sup>1547</sup> The SFWS 44.

<sup>1548</sup> The SFWS 44.

<sup>1549</sup> The *Free Basic Water Implementation Strategy* 2007 18.

<sup>1550</sup> The *Free Basic Water Implementation Strategy* 2007 18.

Strategy specifically states that the costs of the supply of water service provision greatly affects the ability of municipalities to make free water services available.<sup>1551</sup>

The *NWRS* places emphasis on the challenge of non-revenue water, or water loss, and states that although some municipalities have begun addressing the issue, concerted effort is still required to reduce such losses.<sup>1552</sup> The Strategy indicates that water efficiency and curbing non-revenue water must be high on the agenda of each institution and individual in South Africa.<sup>1553</sup> As with many other instruments discussed here, the *NWRS* also stresses the value of water conservation and demand management measures in this regard.<sup>1554</sup>

The *NWRS* states that such measures will have multiple benefits pertaining to, specifically, mitigation against climate change, the postponement of the need for infrastructure augmentation, support to economic growth, as well as ensuring that there is sufficient water available for equitable provision and allocation.<sup>1555</sup> In addition, the Strategy states that municipalities must address effective asset management to guarantee the sustainability of infrastructure, as well as to reduce water losses from poorly maintained infrastructure. It is said that due to the high levels of non-revenue water in municipalities, setting targets would yield little benefit, and municipalities must, therefore, initiate the necessary actions and measures to reduce their losses.<sup>1556</sup> Consequently, municipalities are urged to focus on water conservation and demand management measures to halve their non-revenue water levels.<sup>1557</sup> Municipalities must report, on a quarterly basis, on the reduction of their non-revenue water, and the activities undertaken to achieve such reductions.<sup>1558</sup>

In the case of non-revenue water, the RDI Roadmap suggests certain actions to address the issue and reduce the levels thereof in municipalities, while increasing efficiency and

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<sup>1551</sup> The *Free Basic Water Implementation Strategy* 2007 18.

<sup>1552</sup> The *NWRS* iv.

<sup>1553</sup> The *NWRS* 14.

<sup>1554</sup> The *NWRS* iv, 53.

<sup>1555</sup> The *NWRS* iv, 53.

<sup>1556</sup> The *NWRS* 57.

<sup>1557</sup> The *NWRS* 58.

<sup>1558</sup> The *NWRS* 58.

productive water usage.<sup>1559</sup> These actions include reducing water transport losses and reducing leakages.<sup>1560</sup> Under the umbrella of improving "performance of Pricing, Monitoring, Metering, Billing and Collection", the Roadmap posits that municipalities should aim to reduce the levels of unmetered use, which may aid in better controlling non-revenue water.<sup>1561</sup> To achieve a drop in non-revenue water levels and to address other issues affecting its finances, the RDI Roadmap encourages municipalities to run water as a "financially sustainable business by improving operational performance".<sup>1562</sup> This includes ensuring that their non-revenue water is below 15%, that all domestic and industrial users are on metered supplies, and that all leaks are detected within 12 hours and repaired within 48 hours.<sup>1563</sup>

The issue of non-revenue water is afforded significant attention in the *Master Plan*. Upon analysis, it seems that in terms of Section 1: Water and Sanitation Management (which speaks to, for example, reducing water demand and increasing supply) of Volume 1 of the *Master Plan*, addressing non-revenue water in municipalities in terms of the key actions for this section is placed right after "planning" (which entails developing reconciliation planning studies, feasibility studies, and water service delivery master plans, amongst others).<sup>1564</sup> In terms of Section 2: Enabling Environment (which speaks to, for example, creating effective water sector institutions) of the *Master Plan*, a key action is to implement accurate billing and effective revenue management systems in all entities in the water value chain with restricted supply to domestic users who fail to pay is recognised. Arguably, the latter further encourages addressing non-revenue water. It is thus emphasised that revenue management should be enhanced, specifically through enhanced collection via accurate metering and billing and the fair and quick resolution of disputes with customers.<sup>1565</sup>

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<sup>1559</sup> The RDI Roadmap 96.

<sup>1560</sup> The RDI Roadmap 96.

<sup>1561</sup> The RDI Roadmap 96.

<sup>1562</sup> The RDI Roadmap 72.

<sup>1563</sup> The RDI Roadmap 72.

<sup>1564</sup> The *Master Plan* 15.

<sup>1565</sup> Volume 2 of the *Master Plan* 18.

Volume 2: Plan to Action of the *Master Plan* indicates that according to the International Water Association, the water balance for water losses and non-revenue water demonstrates that both issues are growing at an increased rate, despite the water conservation and demand management projects implemented.<sup>1566</sup> This balance confirms that the state of non-revenue water is a serious concern. These issues have spiked from 2012 at 38% to 41% in the year 2016.<sup>1567</sup> As such, the *Master Plan* suggests intensified implementation of water conservation and demand management measures to maintain both variables in acceptable targets and parameters as set out in the relevant Reconciliation Strategies.<sup>1568</sup>

Moreover, in response to the dire state of non-revenue water, the Strategic Water Partners Network-SA was established between the DWS. The "No Drop Programme" was borne from this partnership.<sup>1569</sup> The latter programme is an incentive-based regulatory programme that aimed to build on the then-already successful Green Drop and Blue Drop Programmes, and its purpose was to assist water services authorities to assess and improve their non-revenue water, water losses, and water use efficiency.<sup>1570</sup> The *Master Plan* describes the No Drop Programme as one based on assessments against certain criteria, which aids in evaluating a municipality's performance against both legal and international best practice requirements.<sup>1571</sup> In 2014, a No Drop assessment was conducted and focused on three key performance areas in water service authorities, namely water balance; strategy, planning and implementation; and performance and compliance.<sup>1572</sup> From the results of this assessment, it was determined that municipalities should focus on improving their planning duties and the quality of their planning, as well as intensifying and accelerating their implementation efforts going forward.<sup>1573</sup>

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<sup>1566</sup> Volume 2 of the *Master Plan* 25.

<sup>1567</sup> Volume 2 of the *Master Plan* 25.

<sup>1568</sup> Volume 2 of the *Master Plan* 25.

<sup>1569</sup> Volume 2 of the *Master Plan* 26.

<sup>1570</sup> Volume 2 of the *Master Plan* 26.

<sup>1571</sup> Volume 2 of the *Master Plan* 27.

<sup>1572</sup> Based on this, if a water service authority achieved a 90% No Drop score or more, these water services authorities were considered knowledgeable of their water conservation and demand management measures; see Volume 2 of the *Master Plan* 27.

<sup>1573</sup> Volume 2 of the *Master Plan* 27.

#### **4.4.2 Illegal water use**

An analysis of the relevant legal instruments discussed above<sup>1574</sup> proved to entail duties for municipalities concerning the challenge of illegal water use. The instruments that, in this instance, were found to include content and duties relating to illegal water use are the *WSA*; the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*; the *Norms and Standards in Respect of Tariffs for Water Services*; the *Systems Act*; the *SFWS*; the *Framework for a Municipal Indigent Policy*; the *Free Basic Water Implementation Strategy*; the *NWRS*; the *NDP*; and the RDI Roadmap. The *NWA* will be briefly mentioned, after the discussion of the Regulations, insofar it pertains to the offences the *NWA* establishes regarding illegal water use. As with the previous section, these instruments will be discussed in the latter order and will be examined according to the duties that they hold for municipalities.

Firstly, the *WSA* does not address the issue of illegal water connections or unauthorised use extensively. It does, however, state that water services authorities have the duty to ensure access to water services subject to the duty of consumers to pay reasonable charges, the duty to conserve water resources, and the right of the relevant water services authority to discontinue or limit the provision of water services, should a failure on the part of the consumer arise concerning the complying with the reasonable conditions set for the provision of water services.<sup>1575</sup> From this, one may derive that the *WSA* does not condone the use of water where the consumer does not comply with the reasonable conditions set out in the Act.<sup>1576</sup> In addition, the *WSA* indicates that every water services authority must make bylaws that address, *inter alia*, the prevention of unlawful connections to water services works and the unlawful or wasteful use of water.<sup>1577</sup> Water boards are also required to set conditions for water conservation and the prevention of wasteful or unlawful use of water provided by the water board.<sup>1578</sup>

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<sup>1574</sup> See para 3.3 above.

<sup>1575</sup> S 11(2)(d), (e), (g) of the *WSA*.

<sup>1576</sup> S 11 of the *WSA*.

<sup>1577</sup> S 21(1)(g) of the *WSA*.

<sup>1578</sup> S 33(1)(f) of the *WSA*.

As previously mentioned, in terms of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*, a water services audit must be included in the annual report of a water services authority and should include figures pertaining to, e.g., the number of user connections in each sector, as well as the number of households who have been provided with water through communal water services works, and the number of new water supply connections established.<sup>1579</sup> The aforementioned does not necessarily place any duty on cities regarding illegal water connections, but by requiring that such information be recorded allows cities to establish whether illegal connections may exist or not. This is invaluable information, since illegal water use technically forms a part of the non-revenue water calculation of cities, and may thus aid cities in determining the specific amount of water lost due to illegal or unauthorised water use.<sup>1580</sup>

Illegal meter connections may be uncovered with more regularity by requiring cities to record new meter installations at consumer installations, the number of meters tested, and the number of meters replaced expressed as a percentage of the total number of meters installed at consumer connections.<sup>1581</sup> The duty on cities to include in their water services development plan their water conservation and demand management measures, specifically the recording of information as to the total quantity of water unaccounted for also plays a role in establishing potential illegal water use.<sup>1582</sup> A water services institution must ensure that a suitable water volume measuring device or volume controlling device is fitted to all user connections provided with water supply services.<sup>1583</sup>

The Regulations state that should, for instance, an individual dwelling in a new sectional title development, group housing development or apartment building have been constructed or installed after the promulgation of these Regulations, then a suitable water volume measuring device or volume controlling device must be installed separately to

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<sup>1579</sup> See para 4.4.1 above; see also s 10(2)(b)(i), (ii), (vi) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1580</sup> See para 3.3.1 and 3.3.2 above.

<sup>1581</sup> Reg 10(2)(e) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1582</sup> Reg 10(2)(g)(ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1583</sup> Reg 13(1)(a) – (b) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.



control and measure water supply thereto.<sup>1584</sup> The latter also applies to individual buildings and irrigation systems.<sup>1585</sup> Upon interpretation, this duty arguably entails that cities must diligently install water volume measuring devices, especially in areas where development is taking place, to curb the number of unauthorised or illegal connections being established. By undertaking this duty, one may further argue that they may potentially uncover illegal water connections by routinely checking for new developments that may require water connections, and, thus, water meters. It may be said that the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*, therefore, play an integral role insofar as illegal or unauthorised water use or connections are concerned.

As per the *Norms and Standards in Respect of Tariffs for Water Services*,<sup>1586</sup> any tariff determined by a water services institution regarding the provision of water services to consumers may include a fixed charge.<sup>1587</sup> A connection fee for connecting a consumer to a water services work may also apply.<sup>1588</sup> In the case of unauthorised connections, a water services institution is entitled to charge a connection fee for upgrading the unauthorised connection, in addition of any other action the institution is entitled to take against such a consumer.<sup>1589</sup>

Upon evaluation, the *NWA* does not place any duties on water services authorities with respect to illegal water connections. Instead, it determines certain offences in relation thereto. For instance, it is considered an offence should any person unlawfully and intentionally or negligently interfere or tamper with any waterwork, or any measuring device or seal attached to a waterwork,<sup>1590</sup> or fails to register existing, lawful water use

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<sup>1584</sup> Reg 13(2)(a) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1585</sup> Reg 13(2)(b) – (c) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1586</sup> *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001

<sup>1587</sup> Reg 8 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1588</sup> Reg 9 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1589</sup> Reg 10 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1590</sup> S 15(1)(e) of the *NWA*.

when required to do so by a responsible authority.<sup>1591</sup> Anyone who is found guilty of such offences is liable on their first conviction to a fine or imprisonment for a period no longer than five years, or to both a fine and imprisonment, and in the case of a subsequent conviction, a person may be subjected to either both a fine and imprisonment, or a fine or imprisonment not exceeding ten years.<sup>1592</sup>

Certain provisions in the *Systems Act* are integral to curbing illegal water use in municipalities. According to Chapter 9 of the Act, which concerns credit control and debt collection, a municipality must adopt, maintain and implement a debt collection and credit control policy that is consistent with its rates and tariffs, and which complies with the provisions of the Act.<sup>1593</sup> The contents of this policy must provide for, *inter alia*, matters pertaining to unauthorised consumption of services, including damages and theft.<sup>1594</sup>

Furthermore, a municipality must adopt bylaws to give effect to its credit control and debt collection policy, including its implementation and enforcement.<sup>1595</sup> A supervisory authority must oversee and monitor the enforcement and implementation of the relevant policy and bylaw, as well as the performance of the municipal manager in question in implementing said policy and bylaw.<sup>1596</sup> The policy and bylaw may also be subjected to review and evaluation, as well as its implementation, by the supervisory committee, so as to allow it to improve the efficiency of the credit control and debt collection processes, mechanisms and procedures in place.<sup>1597</sup>

A municipal manager or service provider, while seeing to the implementation and enforcement of the policy and bylaw, must establish effective administrative mechanisms, procedures and processes to collect due and payable money.<sup>1598</sup> Finally, section 101 of the *Systems Act* ensures that authorised representatives of a municipality or service providers have access to premises in a municipality to read, install, inspect, or repair any

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<sup>1591</sup> S 15(1)(g) of the *NWA*.

<sup>1592</sup> S 15(2) of the *NWA*.

<sup>1593</sup> S 96(b) of the *Systems Act*.

<sup>1594</sup> S 97(1)(h) of the *Systems Act*.

<sup>1595</sup> S 98 of the *Systems Act*.

<sup>1596</sup> S 99(a)(i) – (ii) of the *Systems Act*.

<sup>1597</sup> S 99(b) of the *Systems Act*.

<sup>1598</sup> S 100(a) – (b) of the *Systems Act*.

meter or service connection, or to disconnect, restrict or stop the provision of any service. The latter provision is essential for municipalities to be able to detect unauthorised connections that may lead to illegal water use, as well as to rectify such connections and establish an authorised connection.

The SFWS states that all connections providing an uncontrolled volume of water supply must be metered, and that tariffs shall be applied in proportion to the water used.<sup>1599</sup> The SFWS also states that water services authorities may, after a warning, disconnect water provision to a consumer where services equipment has been tampered with, due to the fact that tampering may jeopardise consumer health and the proper functioning of the system.<sup>1600</sup> In addition, in the instance where a domestic consumer's access to water services has been restricted as a result of due process or appropriate policy, and that consumer interferes with the restriction so as to render the limitation less effective, the water services authority may, after a warning, disconnect water provision to the consumer until the outstanding amount or fine has been settled.<sup>1601</sup>

The *Framework for a Municipal Indigent Policy* (2005) provides that establishing effective governance and administration needs to be stressed, since failing to do so will perpetuate institutional poverty in many parts of South Africa.<sup>1602</sup> Consequently, poor households may resort to accessing basic services, such as water provision, through illegal connections.<sup>1603</sup> Such actions indicate that a municipality has not yet been brought into a reliable, systematic, and financially sustainable programme of municipal support that will ensure that basic services are available at affordable levels.<sup>1604</sup>

The *Free Basic Water Implementation Strategy* of 2007 holds that there are high levels of illegal water connections in larger water schemes and that many households may be receiving subsidised and free water regardless of their income level and at volumes in excess of 6000 litres per month.<sup>1605</sup> As such, the Strategy insists that in instances where

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<sup>1599</sup> The SFWS 34.

<sup>1600</sup> The SFWS 37.

<sup>1601</sup> The SFWS 37.

<sup>1602</sup> The *Framework for a Municipal Indigent Policy* (2005) 8.

<sup>1603</sup> The *Framework for a Municipal Indigent Policy* (2005) 8.

<sup>1604</sup> The *Framework for a Municipal Indigent Policy* (2005) 8.

<sup>1605</sup> The *Free Basic Water Implementation Strategy* 2007 34.

municipalities take control over such schemes, appropriate management arrangements must be in place.<sup>1606</sup> This should be supplemented with tariff policies aimed at securing financial sustainability, as well as adequate technical resources and credit control measures.<sup>1607</sup>

The *NWRS* stresses that water services authorities must develop water services development plans, and that water loss management initiatives must be reviewed annually.<sup>1608</sup> Furthermore, it emphasises that water services authorities should implement and report on the total quantity of water unaccounted for (which includes water from illegal connections), demand management activities undertaken, progress made with the installation of water efficient devices, measures implemented, and an updated water balance.<sup>1609</sup> The *NWRS* states that water conservation and demand management is the highest priority for municipalities, including improved asset management.<sup>1610</sup>

It is also stated that a review of existing water allocations is necessary in areas where new users may seek access, but where current water users are consuming more than can be provided reliably.<sup>1611</sup> If these reviews are not undertaken, the *NDP* suggests that illegal connections may ensue, as well as the over-allocation of resources.<sup>1612</sup> Such consequences will result in a reduction in supply reliability, and may jeopardise existing economic and social problems as well as cause damage to the environment.<sup>1613</sup> In terms of the RDI Roadmap, unlawful water use is recognised as part of improving management of customer use and demand.<sup>1614</sup> As such, the RDI Roadmap indicates that unmetered connections must be detected, and it must be ensured that meters are operating properly.<sup>1615</sup>

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<sup>1606</sup> The *Free Basic Water Implementation Strategy* 2007 34.

<sup>1607</sup> The *Free Basic Water Implementation Strategy* 2007 34.

<sup>1608</sup> The *NWRS* 53.

<sup>1609</sup> The *NWRS* 53.

<sup>1610</sup> The *NWRS* 53.

<sup>1611</sup> The *NDP* 181.

<sup>1612</sup> The *NDP* 181.

<sup>1613</sup> The *NDP* 181.

<sup>1614</sup> The RDI Roadmap 91.

<sup>1615</sup> The RDI Roadmap 91.

### **4.4.3 Insufficient data**

Upon examining the relevant legal instruments, several duties in relation to the challenge of insufficient data on cities were identified. Notably, this section may, throughout refer to "information" rather than data, since processed data constitutes information, and the term "information" is more frequently referenced in South African water law. The legal instruments that provided duties and content to the issue of data or information in cities' water service delivery context include the *WSA*; the *Systems Act*; the *NEMA*; the *MFMA*; the *SFWS*; the *Framework for a Municipal Indigent Policy*; the *Free Basic Water Implementation Strategy*; the *NWRS*; the *Master Plan*; and the *NCCAS*. These instruments will be examined below. Although they do not impose any direct duties on municipalities within this context, the *CIPA* and the *NWA* are also discussed briefly.

Firstly, as per the *WSA*, water services authorities must provide a report concerning the implementation of its water service delivery plan every financial year, and at least within four months after the end of the financial year. The report must be issued to the relevant Ministers, every organisation that represents municipalities and that have jurisdiction within the area, as well as the relevant Province.<sup>1616</sup> As part of its reporting duties, the municipality must publish a summary of its report.<sup>1617</sup> Both a copy of the report and the summary thereof must be available for inspection at the municipality's office, and must be obtainable against payment of a nominal fee.<sup>1618</sup>

As part of the main objectives of the *WSA*, it provides for the duty to gather information in a national information system and distribute that information.<sup>1619</sup> The national information system is provided for in sections 67 to 70 of the *WSA*. The latter sections set out the establishment of a national information system,<sup>1620</sup> the purpose of such a system,<sup>1621</sup> the provision of information,<sup>1622</sup> as well as the funding of the information

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<sup>1616</sup> See s 18(2)(a) – (b) of the *WSA*.

<sup>1617</sup> S 18(3) of the *WSA*.

<sup>1618</sup> S 18(4)(a) – (b) of the *WSA*.

<sup>1619</sup> S 2(h) of the *WSA*.

<sup>1620</sup> S 67 of the *WSA*.

<sup>1621</sup> S 68 of the *WSA*.

<sup>1622</sup> S 69 of the *WSA*.

system.<sup>1623</sup> The establishment of the national information system allows for the provision of processed data regarding water service provision in the form of information to the public, and the system has been scrutinised in this study.<sup>1624</sup>

According to the *WSA*, it is the responsibility of the Minister to see to the establishment of a national information system on water services, which may form a part of a larger system on water.<sup>1625</sup> The public is entitled to reasonable access to the information contained in such a system, and the Minister must take reasonable steps to ensure that the information provided therein is in an accessible format.<sup>1626</sup> No explanation is provided concerning what constitutes an accessible format, but from analysing the existing national information system, one may conclude that it involves processed data that provides relevant statistics and information about water services in the country.<sup>1627</sup>

The *WSA* stipulates that the Minister may require any province, water services institution or consumer to furnish relevant information to be concluded in the national information system.<sup>1628</sup> In the instance of a water services institution, the duty to provide information is spread between water services authorities, water services providers, boards and committees. Hence, municipalities may, upon request, be required to provide information regarding its water services provision to be included in the national information system.

The purpose of the national information system is to record and provide data for the monitoring, implementation and development of national policy on water services.<sup>1629</sup> In addition, the purpose is to furnish information to water services institution, consumers and the public to allow them to monitor the performance of water services institutions, to conduct research, and for any additional lawful reason.<sup>1630</sup> The *WSA* recognises that it constitutes an offence if a person fails or refuses to provide information or gives misleading or false information when required to furnish information in terms of the

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<sup>1623</sup> S 70 of the *WSA*.

<sup>1624</sup> See para 3.3.3 above.

<sup>1625</sup> S 67(1) – (2) of the *WSA*.

<sup>1626</sup> S 67(3) – (4) of the *WSA*.

<sup>1627</sup> See para 3.3.3 above.

<sup>1628</sup> S 69 of the *WSA*.

<sup>1629</sup> S 68(a) of the *WSA*.

<sup>1630</sup> S 68(b)(i) – (iii) of the *WSA*.

Act.<sup>1631</sup> This is particularly valuable, because it provides for both transparency and accountability in the water services sector, especially insofar as water service provision is concerned.

In the instance that water services are delivered by water services providers in a municipality, the water services provider may be obliged to provide information pertaining to the provision of water services, as may be reasonably requested by the water services authority in question, the relevant province, the Minister, a consumer or a potential consumer.<sup>1632</sup> A somewhat similar duty is placed on water services committees in the instance that they are required by the Minister or any authorised person to provide information concerning the affairs and financial position of the water services committee, including access to accounts, books, documents and other assets of the water services committee that may be required.<sup>1633</sup> This is often the case when the Minister or water services authority appoints a person to investigate the financial position and affairs of the water services committee.<sup>1634</sup> Likewise, water services institutions must provide information required by the Minister in order to fulfil the performance monitoring duties envisioned in section 62(1) of the *WSA*.

Chapter 14 of the *NWA* allows for monitoring, assessment and information.<sup>1635</sup> It sets out content for the establishment of a national monitoring system, as well as national information systems.<sup>1636</sup> These functions are managed by the Minister, and beyond stipulating that any person may be required to provide data, information, documents, samples or materials necessary for any national monitoring or information system,<sup>1637</sup> no duties are placed on municipalities in this regard. The pricing strategy for water use charges may contain a strategy for setting water use charges for funding water resource management, which includes, among others, the costs of gathering information, monitoring water resources and the use thereof, as well as controlling water resources

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<sup>1631</sup> S 82(1)(e) of the *WSA*.

<sup>1632</sup> See s 23 of the *WSA*.

<sup>1633</sup> S 59(1)(a) – (b) of the *WSA*.

<sup>1634</sup> S 59(2) of the *WSA*.

<sup>1635</sup> See ss 137 – 145 of the *NWA*.

<sup>1636</sup> S 137, 139 of the *NWA*.

<sup>1637</sup> S 141 of the *NWA*.

and water conservation.<sup>1638</sup> The funding of the provision of information in the *NWA* is, therefore, different from the provisions set out in the *WSA*. The *WSA* allows for the Minister to fund and maintain the national information system with money appropriated by Parliament for such purposes, or by charging for access to information on the system.<sup>1639</sup> Again, in this instance, no duties are placed on municipalities to fund the provision of data or information.

The *Systems Act* allows for provincial monitoring of municipalities, as well as national monitoring and standard setting.<sup>1640</sup> The latter includes the furnishing of information.<sup>1641</sup> The provincial monitoring of municipalities is essential insofar it allows for the Member of the Executive Council for local government to assess whether a municipality cannot or does not fulfil a statutory obligation binding on that municipality, or whether fraud, corruption, maladministration, or any other serious malpractice is occurring or has occurred in the municipality of that province.<sup>1642</sup> The *Systems Act*, similar to the *WSA*, makes provision for the Minister to request information from municipalities concerning the affairs of the municipalities, as set out by notice in the Government Gazette.<sup>1643</sup> This may be done at regular intervals, or within a specified period. Hence, the duty on municipalities to furnish information pertaining to their functioning, affairs or service provision is well established in national law.

Furthermore, as part of the duties of municipal administrations, they must give members of the local community accurate and full information pertaining to the level and standard of municipal services that they are entitled to receive.<sup>1644</sup> The above duty extends to informing the community of how the municipality is managed, of the costs involved, as well as the persons in charge.<sup>1645</sup> These duties relate to essential elements of ensuring that cities have sufficient data, namely so that the data or information can inform their

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<sup>1638</sup> S 56(2)(a)(i) – (v) of the *NWA*.

<sup>1639</sup> S 70(1) – (2) of the *WSA*.

<sup>1640</sup> Chapter 10 of the *Systems Act* generally deals with provincial and national monitoring and standard setting; see ss 105 – 108 of the *Systems Act*.

<sup>1641</sup> S 107 of the *Systems Act*.

<sup>1642</sup> See ss 105 – 106 of the *Systems Act*.

<sup>1643</sup> S 107 of the *Systems Act*.

<sup>1644</sup> S 6(2)(e) of the *Systems Act*.

<sup>1645</sup> S 6(2)(f) of the *Systems Act*.



decision-making, which has an effect on the community,<sup>1646</sup> while at the same time communities can stay informed of what they are entitled to, and what is being done in the municipality to take care of their needs. One may argue that this is of particular relevance to water services, since these duties allow communities to hold municipal administrations accountable should they not receive at least the basic level of water supply that they are entitled to.

The *NEMA* provides for issues relating to "information" in numerous instances in its text. Section 31 of the *NEMA* specifically determines the provisions relevant to access to environmental information and the protection of whistle-blowers. Section 31(1)(a) allowed every person to have access to information relating to the implementation of the *NEMA*, and any other law that relates to the environment, but has subsequently been deleted by section 14 of the *National Environmental Laws Amendment Act*.<sup>1647</sup> Nevertheless, as far as access to information is concerned in terms of the *NEMA*, section 6 of the *Promotion of Access to Information Act*<sup>1648</sup> (hereafter the *PAIA*) states that nothing in the relevant Act prevents the giving of access to a record of a public or private body in terms of the *NEMA*.

Under reports and reportable matters, the *MFMA* provides for access to information by determining the information to be placed on the websites of municipalities.<sup>1649</sup> This section states that the accounting officer of a municipality must place on the website of the municipality certain documents, for instance, all budget-related policies; the annual report; performance agreements; all service delivery agreements; an information statement stating assets over a prescribed value that have been disposed of in the previous quarter; public-private partnership agreements; all quarterly reports tabled in the council; as well as any other documents that must be made available on the website in terms of the *MFMA*, or any other applicable legislation as may be prescribed.<sup>1650</sup> The *MFMA* prescribes that these documents must be placed on the website of the municipality

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<sup>1646</sup> See para 3.3.3 above.

<sup>1647</sup> The *National Environmental Laws Amendment Act* 14 of 2009.

<sup>1648</sup> S 6 of the *Promotion of Access to Information Act*.

<sup>1649</sup> S 75 of the *MFMA*.

<sup>1650</sup> S 75(1)(a) – (l) of the *MFMA*.

no later than five days after the tabling thereof by the council or on the date on which it must be made public, whichever date occurs first.<sup>1651</sup>

The issue of "information" in terms of the *CIPA* looks vastly different. The purpose of the *CIPA* includes ensuring that any information regarding the security measures applicable to critical infrastructure remains confidential, subject, of course, to the provisions in the *PAIA* or any other Act that necessitates the lawful disclosure of information.<sup>1652</sup> The *CIPA* provides that the National Commissioner must develop uniform standards, guidelines and protocols regarding the manner in which information that may be relevant to critical infrastructure protection is shared between the relevant stakeholders.<sup>1653</sup>

Once infrastructure has been declared as critical, the Minister may consult the person in control of the infrastructure, and while taking into account the likelihood of the security of the critical infrastructure being compromised, determine restrictions on the publication of information pertaining to some security measures that are implemented at critical infrastructure.<sup>1654</sup> The Act goes as far as categorising the unlawful furnishing or dissemination of information by any person relating to the security measures applicable at or in respect of a critical infrastructure, in any manner whatsoever, as an offence.<sup>1655</sup> Accordingly, the *CIPA* places no obligations on cities to record any data, but instead generally prescribes that all confidential information on critical infrastructure, which includes infrastructure necessary for the delivery of water services, must be protected.

The SFWS explicitly provides for the duty to provide information. It states that water services authorities have a duty to provide information concerning the provision of water services, as reasonably requested by the Minister or the Department, the relevant province and consumers.<sup>1656</sup> The same obligation is placed on water services providers.<sup>1657</sup> This duty is extended only in that it is also required of the water services provider to report on progress in relation to the business plan, at the minimum on an annual basis,

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<sup>1651</sup> S 75(2) of the *MFMA*.

<sup>1652</sup> S 2(b) of the *CIPA*.

<sup>1653</sup> S 9(2)(a)(iii) of the *CIPA*.

<sup>1654</sup> S 20(3) of the *CIPA*.

<sup>1655</sup> S 26(1)(a) of the *CIPA*.

<sup>1656</sup> The SFWS 12.

<sup>1657</sup> The SFWS 14.

and furnish any information required by the water services authority for its monitoring purposes.<sup>1658</sup> The SFWS sets out the role of the Department in this regard, and says that the Department will manage information to be used for monitoring, support, regulation and planning.<sup>1659</sup> Other national government departments have a general responsibility to support the Department, as the water services sector leader, in fulfilling, for example, its information management roles.<sup>1660</sup>

Instrumental to this discussion on the insufficiency of data in cities is the focus of "knowledge networking" in the SFWS. As per this framework, the purpose of "knowledge networking" is:<sup>1661</sup>

...to ensure that the wealth of water services information and knowledge is accessible, disseminated and applied within the sector. This entails a range of activities from information management to peer learning and lesson sharing through a variety of mechanisms, such as internet-based knowledge hubs, e-mail-based newsgroups, forums, conferences, workshops etc.

The goal of this knowledge network is said to be that *all* sector players should both be able to contribute and access appropriate knowledge from knowledge networks.<sup>1662</sup> The aim is to facilitate informed decision-making within the water sector, and capacity building, specifically within water services institutions.<sup>1663</sup> The SFWS determines that the approach that will be followed in this regard is to build on the capital and potential of existing knowledge management centres, as well as optimise their contributions for the ultimate good of the water sector.<sup>1664</sup>

Consequently, water services knowledge and information will be included in existing and developing local government knowledge networks.<sup>1665</sup> This, in theory, should allow for effective demand-driven mechanisms aimed at sharing knowledge and, coincidentally, supporting the transfer of so-called "best practices" across the sector.<sup>1666</sup> As such, the

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<sup>1658</sup> The SFWS 44.  
<sup>1659</sup> The SFWS 21.  
<sup>1660</sup> The SFWS 21.  
<sup>1661</sup> The SFWS 57.  
<sup>1662</sup> The SFWS 57.  
<sup>1663</sup> The SFWS 57.  
<sup>1664</sup> The SFWS 57.  
<sup>1665</sup> The SFWS 57.  
<sup>1666</sup> The SFWS 57.

SFWS may arguably be considered the first instance in which data or information where cities are concerned are deemed necessary for issues such as decision-making, rather than merely for monitoring and recording.

The SFWS does, nonetheless, make provision for monitoring and information management.<sup>1667</sup> It deems relevant, timely and reliable information necessary for rendering the support given more appropriate and effective by informing the nature and extent of the support needed.<sup>1668</sup> Likewise, monitoring is required for identifying instances where interventions are needed to protect the public interest.<sup>1669</sup>

The SFWS provides certain principles pertaining to monitoring and information management, such as the "scope and comprehensiveness", which dictates that developing a comprehensive, all-encompassing national management information and information system would be a mistake, since ambition may result in the undoing of such systems.<sup>1670</sup> This is so since it may result in the development of large, complex and expensive information systems that may have only partial datasets and which may fail in terms of the original objectives set.<sup>1671</sup> The SFWS suggests the development of fit-for-purpose monitoring and information systems, which are likely to be cost-effective and successful in achieving its goals.<sup>1672</sup>

The "fit for purpose" principle includes that information systems should be fit for purpose, with specific objectives in mind to ensure that only the necessary data is collected.<sup>1673</sup> Furthermore, it encourages a "bottom-up design" for information and monitoring systems, where any information obtained locally should be useful locally, and that public participation in monitoring should be encouraged.<sup>1674</sup> The SFWS prescribes additional principles in relation to the information and monitoring systems envisioned in the framework, namely compatibility, duplication, practicality, public domain, the

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<sup>1667</sup> The SFWS 59.

<sup>1668</sup> The SFWS 59 – 61.

<sup>1669</sup> The SFWS 59 – 61.

<sup>1670</sup> The SFWS 59.

<sup>1671</sup> The SFWS 59.

<sup>1672</sup> The SFWS 60.

<sup>1673</sup> The SFWS 60.

<sup>1674</sup> The SFWS 60.

management of information systems with the aim of improving water service institutions' performance, as well as the strategic development of systems, seeking to maximise the outcomes of a limited set of resources.<sup>1675</sup>

The *Framework for a Municipal Indigent Policy* (2005) also provides for the development of a monitoring system to assess the progress made with implementing the indigent policy, but indicates that the national sphere of government, particularly the then Department of Provincial and Local Government (now known as the Department of Cooperative Governance and Traditional Affairs) should manage the system.<sup>1676</sup> It is expressly stated that the system must be workable for municipalities.<sup>1677</sup> The only duties directly relating to municipalities is that the location of consumer units (including served and un-served units) must be identified on a Geographic Information System (hereafter GIS) that should be controlled by the municipality and which must link to a national system.<sup>1678</sup>

Furthermore, while not expressed as a duty, the Framework states that the national monitoring system in question should link to existing data management and planning systems applied by municipalities.<sup>1679</sup> This implies that municipalities must both have these systems in place, and ensure that it is compatible with national systems. The *Framework for a Municipal Indigent Policy* also states that in terms of information gathering, specifically for maintaining access to information, all information will be collected through annual municipal services surveys which will be run by Statistics South Africa.<sup>1680</sup> Thus, while the information collection will be managed by national means, cities will, at least to some extent, be involved in the process.

The *Free Basic Water Implementation Strategy* of 2007, on the other hand, clearly expresses the duty for water services authorities to provide regular feedback on the implementation of free basic water to the then Department of Water Affairs and Forestry

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<sup>1675</sup> The SFWS 60.

<sup>1676</sup> The *Framework for a Municipal Indigent Policy* (2005) 26.

<sup>1677</sup> The *Framework for a Municipal Indigent Policy* (2005) 26.

<sup>1678</sup> The *Framework for a Municipal Indigent Policy* (2005) 26.

<sup>1679</sup> The *Framework for a Municipal Indigent Policy* (2005) 26.

<sup>1680</sup> The *Framework for a Municipal Indigent Policy* (2005) 26.

(and the now DWS).<sup>1681</sup> This information will be used to monitor and evaluate the implementation process, which will provide a means to assess the water access situation at the local level, and the information will also be provided to Cabinet regularly.<sup>1682</sup> This is a crucial requirement, since the Strategy stipulates that one of the challenges municipalities faced in the provision of free basic services was poor monitoring and duplications in the information requirements from national government.<sup>1683</sup>

However, since the Strategy expressed the fact that the planning and implementation requirements on municipalities pertaining to the free basic water policy are quite substantial, national government is required to provide support in various areas of the implementation process, including providing information and planning tools, and monitor the progress of the policy.<sup>1684</sup> As for the latter-mentioned issue, the Strategy states that national government will monitor the progress of the provision of free basic water via the water services development plans of municipalities, as well as through National Treasury's financial monitoring.<sup>1685</sup> Thus, municipalities must collect data and information on the implementation of the free basic water policy in their area and report thereon in their water services development plans.

The *NWRS* speaks extensively to the importance of information and data, as well as information systems, and monitoring and reporting, but this is primarily aimed at measures to support sustainable water resource management.<sup>1686</sup> While water resource management is not the focus of this study, it is important since proper water management may allow for the availability of adequate resources for water service provision to take place. In turn, good information is pertinent for adequately allocating and re-allocating water supplies.<sup>1687</sup> Municipalities are also obliged to form a part of the information management envisioned by the *NWRS*, especially since the strategy indicates that "Strategy Steering Committees" were established to monitor implementation of the

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<sup>1681</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1682</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1683</sup> The *Free Basic Water Implementation Strategy* 2007 4.

<sup>1684</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1685</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1686</sup> See chapters 9, 13 of the *NWRS*.

<sup>1687</sup> The *NWRS* 50.

strategy, and municipalities, water boards, and water user associations were included in these Committees.<sup>1688</sup>

The *Master Plan* suggests that a lack of data and information due to weak monitoring systems pose high risks when decision-making and planning is concerned.<sup>1689</sup> Effective regulation of water in South Africa requires access to reliable and accurate information on an ongoing basis.<sup>1690</sup> Furthermore, the *Master Plan* raises the point that the capacity of the regulatory authorities to both interpret and respond appropriately and timeously to the relevant data or information is another major challenge for the effective regulation of the water sector.<sup>1691</sup> Most of the actions suggested by the *Master Plan* concerning addressing the data or information issue is aimed at national government or other stakeholders.<sup>1692</sup> Some of the actions suggested that do fall within the purview of cities are that measuring infrastructure must be repaired and maintained, while new technologies should be adopted, and data management and distribution must be improved.<sup>1693</sup>

Thus, cities have various legislative duties to provide data or information regarding their water services provision. However, as previously discussed in this study, cities continue to grapple with the challenge of insufficient data, regardless of how pertinent it is to the adequate fulfilment of their water provision mandate.<sup>1694</sup> This raises the question of whether the duties set out above are adequate in addressing the core challenge, namely the cities' insufficiency of data. In answering this question, it warrants to enquire whether the obligations that *are* placed on cities sufficiently emphasise that, to be contextually precise, water services authorities need information on water services provision for more than merely monitoring and reporting functions.

These water services authorities require the data or information for additional crucial purposes, such as informed decision-making, planning, the identification of problems or

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<sup>1688</sup> The *NWRS* 16.

<sup>1689</sup> Volume 2 of the *Master Plan* 6.

<sup>1690</sup> Volume 2 of the *Master Plan* 4.

<sup>1691</sup> Volume 2 of the *Master Plan* 4.

<sup>1692</sup> See for instance Volume 1 of the *Master Plan* 32, 33, 43, 45, 58, 67, etc.

<sup>1693</sup> Volume 2 of the *Master Plan* 6.

<sup>1694</sup> See para 3.3.3 above.

issues affecting their functioning, as well as to utilise the information to their advantage by employing technological means to, for instance, make predictions about future water needs via predictive analytics.<sup>1695</sup> Consequently, if one reads the duties currently placed on cities in this regard through a broader lens that takes into account the latter issues, one may argue that, at least in part, the challenge of insufficient data in cities relates to an insufficiency in the legislative duties of cities. This argument may further be grounded in the fact that contemporary plans and roadmaps emphasise the multi-faceted role data or information plays or should play in the provision of water by cities, but this is not reflected in the primary legislation governing water services provision.

Lastly, the NCCAS recognises that to properly prepare for the impacts of climate change, the availability of sound information and data on climate change is necessary.<sup>1696</sup> The latter includes the dissemination of predictions and forecasts based on the relevant data to inform decision-making and appropriate responses.<sup>1697</sup> In this regard, the NCCAS defines "climate services" as the term used to encapsulate the different data, information, forecasting and dissemination systems.<sup>1698</sup> These climate services provide science-based information, weather forecasts, climate predictions, and climate projections that may empower decision-makers to manage both risks and opportunities flowing from climate variability and change.<sup>1699</sup> The NCCAS states that it is imperative for climate services to be put in place for those sectors that are especially vulnerable to the impact of climate change.<sup>1700</sup> The latter will ensure that these sectors are furnished with accurate and timely information to assist them in planning responses and reducing risk.<sup>1701</sup>

Many climate services and products have been developed in South Africa, several with direct bearing on the water sector.<sup>1702</sup> However, the NCCAS suggests several actions to improve South Africa's climate products and services. Some of these actions are required

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<sup>1695</sup> See para 3.3.3 above.

<sup>1696</sup> The NCCAS 31.

<sup>1697</sup> The NCCAS 31.

<sup>1698</sup> The NCCAS 31.

<sup>1699</sup> The NCCAS 31.

<sup>1700</sup> The NCCAS 31.

<sup>1701</sup> The NCCAS 31.

<sup>1702</sup> This includes, for instance, the South African Flash Flood Guidance system; Drought Early Warning systems; and the Drought Monitoring Desk. See the NCCAS 31 – 35.



from municipalities, such as developing municipal early warning systems for vulnerable geographical areas.<sup>1703</sup> This action includes that municipalities must improve or develop early warning systems for identified risks in their areas, especially for vulnerable groups.<sup>1704</sup>

#### ***4.4.4 The sustainability of water service delivery***

As with the sections above, upon analysis, various duties on cities pertaining to the issue of sustainable water service delivery could be identified. In this instance, the instruments that provide these duties encompass the *WSA*; the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*, the *Norms and Standards in Respect of Tariffs for Water Services*, the *Structures Act*, the *Systems Act*, the SFWS; the *Framework for a Municipal Indigent Policy*, the *Free Basic Water Implementation Strategy*, the *NWRS*; the *Master Plan*; and the NCCAS. Each of these legal instruments, in regards to the duties they hold for municipalities on the challenge at hand, will be discussed in turn below.

The *WSA*, at various times, addresses the issue of the sustainability of water service delivery. In particular, it requires that details relating to the latter should be set out in every municipality's water service delivery plan. To be specific, water services authorities have the duty to prepare an integrated development plan, or if this has not been done, they must prepare a draft water services development plan, including a summary, for its area of jurisdiction.<sup>1705</sup> This draft water services development plan must contain certain details, for instance, the physical attributes of the area to which it applies; the size and distribution of the population within the area; a time frame for the plan, particularly including an implementation programme for the next five years; existing water services; and the number and location of persons who are not currently receiving basic water provision services.<sup>1706</sup>

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<sup>1703</sup> The NCCAs 36.

<sup>1704</sup> The NCCAS 26.

<sup>1705</sup> See s 12(1)(a) – (b) of the *WSA*.

<sup>1706</sup> S 13 of the *WSA*.

Regarding the future provision of water services, the proposed infrastructure necessary must be indicated, in addition to the estimated capital and operating costs of the water services and the financial details for funding such services.<sup>1707</sup> Furthermore, details such as the maintenance, operation, repair and replacement of existing and future infrastructure; the amount and location of the persons to whom water services cannot be delivered in the following five years, detailing the reasons therefore, and the time frame within which such persons could expect a basic water supply; as well as any current or proposed water conservation, environmental protection and recycling measures taken.<sup>1708</sup>

The interruption of water provision evidently affects the sustainability of the water services supplied. Given this, the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* places the duty on a water services institution to ensure that a consumer has access to alternative water services in the situation where water services that are usually provided are interrupted for more than 24 hours for reasons other than those contemplated in section 4 of the *WSA*.<sup>1709</sup> Alternative water services may entail at least ten litres of potable water per person per day, as well as sanitation services that are sufficient to protect the health of the consumer.<sup>1710</sup> The Regulations also provide that a water services institution must repair any visible, major or reported leaks in its water services system within 48 hours of being made aware thereof.<sup>1711</sup> To ensure that sustainable access to water services is maintained, the Regulations set out that a water services institution must set up a consumer service to which the non-compliance of any of the regulations can be reported.<sup>1712</sup>

The financing of infrastructure plays a significant role with respect to the sustainability of water services. The *Norms and Standards in Respect of Tariffs for Water Services*

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<sup>1707</sup> S 13(h) of the *WSA*.

<sup>1708</sup> S 13(h) of the *WSA*.

<sup>1709</sup> Reg 4 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1710</sup> Reg 4(a) – (b) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1711</sup> Reg 12 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1712</sup> Reg 16 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

prescribe, for instance, that when establishing revenue requirements on which water tariffs must be based, a water services institution must consider, at the minimum, the need to recover water purchase costs; overhead, maintenance and operational costs; the cost of capital not financed through any grant, subsidy or donation; to provide for the replacement, refurbishment as well as extension of water services works; and to ensure that all households have access to at least basic water supplies and basic sanitation.<sup>1713</sup>

Thus, tariffs also play a role in ensuring the sustainable supply of water to communities in terms of how water tariffs are structured. A tariff set by a water services institution for the supply of water to households via communal water services works or through a consumer installation that provides a controlled amount of water must be set to the lowest volume, including a zero amount. The latter applies to the extent that is necessary to ensure both the sustainability and viability of the water services.<sup>1714</sup> Tariffs for an uncontrolled volume of water to a household must include a volume-based charge that takes into account the incremental cost that would be incurred in order to increase the water supply infrastructure's capacity to meet the incremental rise in demand.<sup>1715</sup> Such charges must also support the viability and sustainability of the water supply provision to the impoverished, and discourages inefficient or wasteful usage.<sup>1716</sup> Volume-based charges are levied proportionately to the amount of water provided.<sup>1717</sup>

The *Structures Act* is vital to ensuring sustainable water services. The executive and legislative competencies of a municipality lie in its municipal council.<sup>1718</sup> As such, the *Structures Act* determines that a municipal council must strive to, within its capacity,

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<sup>1713</sup> Reg 2 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1714</sup> Reg 5 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1715</sup> Reg 6(1) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1716</sup> Reg 6(1) of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1717</sup> Reg 1 of the *Norms and Standards in Respect of Tariffs for Water Services* GN R652 in GG 22471 of 20 July 2001.

<sup>1718</sup> See para 4.2 above; s 151(2) of the *Constitution*.

achieve the objectives set out in section 152 of the *Constitution*.<sup>1719</sup> The latter includes to ensure the provision of services to communities in a sustainable manner.<sup>1720</sup>

Therefore, the municipal council of a municipality is required to annually review the needs of the community, the municipalities' priorities to meet those needs, the processes in place for involving the community, its organisational and delivery mechanisms for meeting the community's needs, as well as its overall performance in achieving the objectives referred to in section 152 of the *Constitution*.<sup>1721</sup> A municipal council must develop mechanisms that will allow them to consult with the community and community organisations in executing its powers and performing its functions.<sup>1722</sup> Accordingly, the municipal council of a municipality has a pivotal role to play in ensuring that the municipality at hand meets its service delivery duties.

For instance, should the municipal council fail to review the needs of its community annually, these needs, particularly as it translates into water service delivery needs, may not be sustainably met. This is especially so in cities or urban areas that are prominently afflicted with issues such as rapid population growth and urbanisation. Hence, the needs of such a community will look vastly different from one year to the next, for instance, in terms of its water service delivery requirements, such as the continuous need for the expansion of water infrastructure.

The *Systems Act* provides valuable insight on the sustainability of water services by way of its definition of what is considered "financially sustainable".<sup>1723</sup> Accordingly, the Act states that financially sustainable, as it pertains to the provision of municipal services such as water provision, means the provision of a municipal service in a way that is aimed at safeguarding that the financing of that service from internal and external sources, including budgeted income, subsidies and grants for the service, is sufficient to cover certain costs.<sup>1724</sup> These costs encompass the initial capital expenditure that is necessary

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<sup>1719</sup> S 19(1) of the *Structures Act*.

<sup>1720</sup> See s 152(1)(b) of the *Constitution*.

<sup>1721</sup> S 19(2)(a) – (e) of the *Structures Act*.

<sup>1722</sup> S 19(3) of the *Structures Act*.

<sup>1723</sup> S 1 of the *Systems Act*.

<sup>1724</sup> S 1 of the *Systems Act*.

for the service; operating the services; as well as maintaining, repairing, and replacing the physical assets utilised in the course of services provision.<sup>1725</sup>

This is integral, since the *Systems Act* continues to place a duty on the municipal council of a municipality to strive to ensure that all municipal services are provided to the community in a manner that is both financially and environmentally sustainable.<sup>1726</sup> The latter must be done within the municipality's financial and administrative capacity, and with regard to practical considerations. Furthermore, as the head of administration, the municipal manager is held accountable and responsible for the management of the provision of services to the community in an equitable and sustainable manner.<sup>1727</sup> It is not clear what is meant by a "sustainable manner" in the latter context, but given the previous duty endowed on the municipal council, one may interpret it to include both financial and environmental sustainability. This interpretation may be supported by the subsequent "general duties" placed on municipalities, which includes that the provision of municipal services must be financially sustainable, as well as environmentally sustainable.<sup>1728</sup> The general duties also include that municipal services must be regularly reviewed for the purpose of the upgrading, extension or improvement thereof.<sup>1729</sup>

The *Systems Act* emphasises the importance of tariffs for municipal service delivery, and specifically sustainable service delivery. The Act notes that a municipal council must adopt and implement a tariff policy concerning the levying of fees for municipal services rendered.<sup>1730</sup> These tariffs must be determined at levels that facilitates the financial sustainability of the services rendered, taking into account the subsidisation from sources alternative to the services provided.<sup>1731</sup>

That being said, the Act also requires that tariffs must reflect the costs reasonably associated with providing the municipal service in question, with due consideration of the operating, capital, maintenance, replacement, and administrative costs, as well as the

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<sup>1725</sup> S 1 of the *Systems Act*.

<sup>1726</sup> S 4(2)(d) of the *Systems Act*.

<sup>1727</sup> S 55(1)(d) of the *Systems Act*.

<sup>1728</sup> S 73(2)(c) – (d) of the *Systems Act*.

<sup>1729</sup> S 73(2)(e) of the *Systems Act*.

<sup>1730</sup> S 74(1) of the *Systems Act*.

<sup>1731</sup> S 74(2)(e) of the *Systems Act*.

interest charges.<sup>1732</sup> By placing these duties on municipalities, one may argue that, ideally, the sustainability of services, including insofar as infrastructure-related issues are concerned, are safeguarded by appropriate tariffing. Such tariffing allows for the financial sustainability necessary to guarantee that services are rendered with continuity and are reliable.

As a means of holding the municipality accountable to the community pertaining to issues such as the sustainability of water services, the *Systems Act* sets out the role of councillors in Schedule 1 of the Act. Councillors are elected to represent local communities on municipal councils.<sup>1733</sup> This measure is aimed at ensuring that municipalities, within its available means, meet the needs of the local community by providing equitable, effective and sustainable services.<sup>1734</sup> The role of councillors involves that they must be accountable to the local community, and as such, they must report back on a quarterly basis, at the minimum, on municipal council matters such as the performance of the municipality by way of its established indicators.<sup>1735</sup>

The SFWS speaks extensively to the sustainability of water services. It observes that water services authorities are expected to help communities attain higher and intermediate levels of water services.<sup>1736</sup> Wherever practical, such services must be sustainable and affordable, and should not compromise the national policy priority of universal access to, at the minimum, a basic level of service.<sup>1737</sup> The SFWS states that access to either a tap or toilet is of no use in cases where the water stops flowing or the infrastructure ceases to operate.<sup>1738</sup> Furthermore, the SFWS emphasises that part of sustainable access is ensuring that water services are affordable, and, hence, the Framework promotes the importance of the free basic water policy.<sup>1739</sup> The SFWS refers to the development of a free basic water strategy to ensure sustainable water provision

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<sup>1732</sup> S 74(2)(d) of the *Systems Act*.

<sup>1733</sup> The Preamble of Schedule 1 of the *Systems Act*.

<sup>1734</sup> The Preamble of Schedule 1 of the *Systems Act*.

<sup>1735</sup> See the Preamble of Schedule 1 of the *Systems Act*. Schedule 1 of the *Systems Act* sets out a code of conduct for elected councillors to ensure that they fulfil their obligations to the community.

<sup>1736</sup> The SFWS ii.

<sup>1737</sup> The SFWS ii.

<sup>1738</sup> The SFWS ii.

<sup>1739</sup> The SFWS ii.

through affordable access to water services. Accordingly, the development of the *Free Basic Water Implementation Strategy* of 2007 guarantees the latter sustainability issue presented in the SFWS, and also states that emphasis must be placed on<sup>1740</sup> –

...revenue collection policies and practices of municipalities provided for an adequate supply of free potable water to poor households, while ensuring continued financial viability of municipalities and the sustainability of their water supply systems.

The *Free Basic Water Implementation Strategy* of 2007 continues by stating that focus should also be on ensuring that there is an increase in access to water infrastructure by the impoverished, while maintaining such access via sustainable operational arrangements that must include the appropriate subsidy mechanisms to prevent the "leakage" of subsidies aimed at the poor from benefiting the wealthy.<sup>1741</sup> To improve the sustainability of free basic water provision, it is suggested that municipalities must tend to the lack of integration in planning and the inability to develop long term plans,<sup>1742</sup> addressing, for instance, infrastructure operation and maintenance.

Given its focus on sustainability, the SFWS includes the sustainability challenge as part of the water sector vision. The Framework states that as part of the sector vision:<sup>1743</sup>

Water supply and sanitation services are provided by effective, efficient and sustainable institutions that are accountable and responsive to those whom they serve.

The Framework, additionally, states that as part of the water sector goals, water and sanitation services must be provided sustainably. "Sustainably" is fleshed out by the SFWS since it prescribes that services must be environmentally, financially, socially, and institutionally sustainable.<sup>1744</sup> As may be expected given the discussions above concerning water service delivery challenges, the SFWS again stresses that planning forms part of the responsibilities of water services authorities, specifically, the preparation of water services development plans.<sup>1745</sup> Such plans must be developed in a way that promotes sustainable access to water services, while also promoting sustainable livelihoods and the

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<sup>1740</sup> The *Free Basic Water Implementation Strategy* 2007 2.

<sup>1741</sup> The *Free Basic Water Implementation Strategy* 2007 4.

<sup>1742</sup> The *Free Basic Water Implementation Strategy* 2007 4.

<sup>1743</sup> The SFWS 5.

<sup>1744</sup> The SFWS 5.

<sup>1745</sup> The SFWS 11.

economic development of the community.<sup>1746</sup> Similar to the previous discussions on the relevant challenges, the water provision responsibility of water services authorities is highlighted in the SFWS.<sup>1747</sup> It is stated that provision must be effective, efficient, and sustainable, which requires water conservation and demand management measures.<sup>1748</sup>

To achieve sustainable water service provision, the Framework notes that a key objective for water service authorities is to significantly enhance revenue collection and to improve consumer management.<sup>1749</sup> Additionally, the SFWS insists that water services authorities are responsible for ensuring that adequate investments are made in terms of water services infrastructure, and that these investments must remain sustainable over time.<sup>1750</sup> The sustainability of water services provided to indigent consumers is highlighted in the *Framework for a Municipal Indigent Policy* (2005). Basic services to indigent consumers entails the sustainable operation of the water provision facility, meaning that the water supply must be available for at the least 350 days per annum.<sup>1751</sup> During each incident, the supply should not be interrupted for more than 48 hours consecutively.<sup>1752</sup>

Part and parcel of ensuring access to sustainable water services is to ensure that sufficient water resources are available. Given this, the *NWRS* plays an integral role in safeguarding water resource availability. The vision of the *NWRS* includes guaranteeing sustainable, equitable and secure water for a better environment and life for everyone. To achieve this, the overall sector goal, which encompasses municipalities, is to manage water resources effectively and efficiently for equitable and sustainable development and growth.<sup>1753</sup> The *NWRS* sets out three main objectives in this regard, namely that water supports development and the elimination of poverty and inequality; that water contributes to job creation and the economy; and that water is used, developed, protected, controlled, and managed equitably and sustainably.<sup>1754</sup>

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<sup>1746</sup> The SFWS 11.

<sup>1747</sup> The SFWS 11.

<sup>1748</sup> The SFWS 11.

<sup>1749</sup> The SFWS 15.

<sup>1750</sup> The SFWS 27.

<sup>1751</sup> The *Framework for a Municipal Indigent Policy* (2005) 17.

<sup>1752</sup> The *Framework for a Municipal Indigent Policy* (2005) 17.

<sup>1753</sup> The *NWRS* 12.

<sup>1754</sup> The *NWRS* 12.



Cities, as stakeholders in the water sector, are required to observe the four business principles that the *NWRS* prescribes as part of the foundation of sustainable water resource management and infrastructure management.<sup>1755</sup> The first principle entails striving for efficiency from the source, to the tap and back.<sup>1756</sup> The second principle necessitates the implementation of life cycle planning and the sustainable management of services and assets.<sup>1757</sup> The Strategy suggests that this should be addressed via rigorous asset management and the allocation of sufficient funds.<sup>1758</sup> The third principle highlights sustainable financial management and promotes clear decision-making concerning who should pay for what, and why and where transparent subsidising should be used.<sup>1759</sup> Finally, the fourth principle obliges the application of sound management practices within a developmental framework, including consultation and communication, ongoing investment in skills, capacity building, education, and knowledge and information monitoring systems.<sup>1760</sup>

The *Master Plan* addresses the sustainability of water services throughout its text, with a specific focus on the sustainability of water infrastructure. The Plan states that the country is facing a water crisis caused by, *inter alia*, insufficient water infrastructure maintenance and investment.<sup>1761</sup> As such, part of the five key objectives to build a water-secure future and define a "new normal" in terms of the plan is to ensure effective infrastructure management, maintenance and operation.<sup>1762</sup> The *Master Plan* prescribes that government departments, civil society and the private sector must work together to implement the necessary actions in order to attain functional infrastructure and institutions and financial sustainability.<sup>1763</sup> For instance, as part of one of the key "planning" actions, the *Master Plan* indicates that water services authorities and water boards must assist, for instance, the DWS to develop and implement "Provincial Water Services Delivery Master Plans" aimed at providing sustainable and reliable water and

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<sup>1755</sup> The *NWRS* 15.

<sup>1756</sup> The *NWRS* 15.

<sup>1757</sup> The *NWRS* 15.

<sup>1758</sup> The *NWRS* 15.

<sup>1759</sup> The *NWRS* 15.

<sup>1760</sup> The *NWRS* 15.

<sup>1761</sup> Volume 1 of the *Master Plan* 2.

<sup>1762</sup> Volume 1 of the *Master Plan* 7.

<sup>1763</sup> Volume 1 of the *Master Plan* 8.

sanitation services.<sup>1764</sup> The latter includes the development of "Reliable Services Delivery Action Plans" that address a backlog analysis and infrastructure asset management plans.<sup>1765</sup>

In terms of the NCCAS, certain actions are suggested as part of achieving the outcome of increased resilience and adaptive capacity attained in human, economic, environmental, physical and ecological infrastructure.<sup>1766</sup> To increase physical infrastructure resilience and adaptive capacity, one action recommends investing in high-quality, climate resilient, eco-sustainable, reduced impact public infrastructure and materials.<sup>1767</sup> This infrastructure includes transport, wastewater, stormwater, water, and energy infrastructure capable of withstanding disasters and that have an extended lifespan.<sup>1768</sup>

The above analysis of the chosen legal instruments yielded the identification of approximately 128 collective duties on municipalities concerning the four water service delivery challenges discussed in this study. From the 18 instruments that were examined, a possible 37 duties were isolated pertaining to non-revenue water, while the analysis of illegal water connections produced an estimated 24 duties. Within the ambit of the selected instruments, the challenge of insufficient data produced approximately 28 duties relevant to cities, and an examination of the same law concerning the issue of sustainability of water services generated 39 duties on cities. Weaver *et al*<sup>1769</sup> and Hamer *et al*<sup>1770</sup> suggest that the water legislation in the country, particularly the *WSA* and *NWA* have brought about an adversely complex institutional and governance legacy, with lasting and stubborn inequity in water service provision. Consequently, municipalities are often harshly critiqued for their lack of compliance with their elaborate water provision-

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<sup>1764</sup> Volume 1 of the *Master Plan* 15.

<sup>1765</sup> Volume 1 of the *Master Plan* 15.

<sup>1766</sup> The NCCAS 30.

<sup>1767</sup> The NCCAS 30.

<sup>1768</sup> The NCCAS 30.

<sup>1769</sup> Weaver *et al* 2019 *Geoforum* 2.

<sup>1770</sup> Hamer *et al* 2018 *Water International* 2.

related duties.<sup>1771</sup> Stacey<sup>1772</sup> goes as far as positing that the country's municipalities' non-compliance with legislation promoting the fulfilment of the constitutionally entrenched water right may be seen as a failure of the rule of law.

Nevertheless, it warrants asking whether these duties are *actually* implemented or executed by cities during the fulfilment of their water provision mandate, or are these duties merely ornamental, perhaps as a result of an excessively complex legal system? The following section will briefly explore the latter question.

#### **4.5 The execution of legal duties in selected cities**

The above section discussed the expansive legislative framework pertaining to water services delivery. Subsequently, it identified the range of duties imposed on cities by the relevant national laws, regulations, policies, plans, and strategies on water services delivery regarding specific water service delivery challenges. The challenge now lies in determining whether and to what extent cities respond, comply with or implement at least some of these duties.

As explained in chapter 1, this study relies on a desktop-based analysis of the relevant available sources. It is acknowledged that it would not be possible to accurately determine cities' performance regarding their duties without conducting qualitative research. An example of such a duty is provided in the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*, which states that a water services institution is expected to take steps to reduce the amount of unaccounted-for water.<sup>1773</sup> If and how a municipality has taken such steps can arguably only be scientifically determined by way of empirical research that engages city authorities and others.

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<sup>1771</sup> For views on the issue of the implementation of South Africa's water laws, see generally Stacey 2018 *Law & Social Inquiry*; Hamer *et al* 2018 *Water International*; Development Bank of Southern Africa *Municipal compliance with water services policy: A challenge for water security*; and Belinskij and Kotzé 2016 *Aquatic Procedia* 37.

<sup>1772</sup> Stacey 2018 *Law & Social Inquiry* 796. See also Stacey's comments on the "inconsistency thesis" regarding the rule of law and social justice; Stacey 2018 *Law & Social Inquiry* 797.

<sup>1773</sup> Reg 11 of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

It would understandably be impossible to measure the implementation of each and every one of the duties isolated in the previous section of this chapter. For this reason, eight duties were selected. These duties were, first and foremost, selected on the basis of the probability of finding information that would allow for a scientifically valid evaluation of a city's performance. Two duties have been allocated for each of the four challenges.<sup>1774</sup> The evaluation of cities' performance concerning these eight duties relied on the information provided in the water services development plans, annual water service reports, strategic frameworks and bylaws available on the websites of three specific cities, as well as an analysis of relevant sections of the NWSKS. The cities are the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and the Nelson Mandela Bay Metropolitan Municipality. As previously explained, these cities were selected on the basis of the technological water management initiatives or plans that they have in place. Additionally, each of the three cities suffer from the specific water provision-related challenges, namely, non-revenue water, illegal water connections, insufficient data, and the sustainability of water services provision.<sup>1775</sup>

The eight duties that have been identified for the evaluation for city performance are: In terms of the challenge of non-revenue water, the duties are to include an audit in the annual water services report,<sup>1776</sup> and to include water conservation and demand management measures in their water services development plans.<sup>1777</sup> Regarding the issue of illegal water connections, the duties to create bylaws on the prevention of unlawful connections,<sup>1778</sup> and to indicate the quantity of unaccounted for water in water services audits will be evaluated.<sup>1779</sup> On the challenge of insufficient data, cities' performance concerning the duties to furnish information to National Information Systems,<sup>1780</sup> and to provide feedback on the implementation of free basic water<sup>1781</sup> will be ascertained. Finally,

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<sup>1774</sup> Namely non-revenue water, illegal water connections, insufficient data and the sustainability of water services provision.

<sup>1775</sup> See para 1.9 above.

<sup>1776</sup> Reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1777</sup> The SFWS 44.

<sup>1778</sup> S 21(1)(g) of the *WSA*.

<sup>1779</sup> Reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1780</sup> S 69 of the *WSA*.

<sup>1781</sup> The *Free Basic Water Implementation Strategy* 2007 29.

concerning the challenge of the sustainability of water provision services, cities' duties to enhance revenue collection,<sup>1782</sup> and to invest in climate-resilient infrastructure will be evaluated.<sup>1783</sup>

As previously mentioned in this section, the evaluation of municipal performance on the eight identified duties was done by way of an exploration of desktop-based sources that are publicly available. These include reports that have been produced by the CoJ, the eMM and the NMBMM. Notably, there is no guarantee that the information provided in these reports are correct. It was not possible for the researcher to verify the information captured in the reports which is a risk factor to acknowledge. Furthermore, the investigation below depended on the availability of, for instance, the most up-to-date water services development plans, strategic frameworks, and bylaws of the three municipalities. It is acknowledged that the mere existence of these instruments do not presuppose their implementation. Despite these drawbacks, the evaluation of the available city-level information provides valuable insights concerning the planning, law and policy direction and principled commitment of the municipalities in as far as it concerns the execution of their duties to address the issues of non-revenue water, illegal water connections, insufficient data, and the sustainability of water services provision.

#### ***4.5.1 City of Johannesburg Metropolitan Municipality***

Before commencing with the evaluation of the cities' performance with regards to the particular duties, it is necessary to briefly provide context concerning Johannesburg Metropolitan Municipality. The City of Johannesburg (hereafter, CoJ) is known as the largest metropolitan municipality in South Africa, with an estimated population of 5.4 million persons.<sup>1784</sup> The City describes itself as the financial and economic hub of South Africa, and has a population growth rate of 3.01% as measured between 2007 to 2017.<sup>1785</sup> It is estimated that the population could expand to 7.6 million within the next 20 years.<sup>1786</sup> The City regards this as an opportunity, but also views this growth as challenging,

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<sup>1782</sup> The SFWS 15.

<sup>1783</sup> The NCCAS 30.

<sup>1784</sup> The CoJ *Annual Report 2017/2018* 26.

<sup>1785</sup> The CoJ *Annual Report 2017/2018* 28.

<sup>1786</sup> The CoJ *Annual Report 2017/2018* 26.

particularly in terms of service delivery, infrastructure, and other key issues.<sup>1787</sup> The CoJ is viewed as one of the cities with the highest inequality levels worldwide, with poverty and inequality remaining some of the cities' most significant challenges.<sup>1788</sup> These challenges are largely influenced by aggravating circumstances, such as spatial inequality, high rates of unemployment, and low skill levels.<sup>1789</sup> The City also experiences various service delivery challenges and breakdowns. These breakdowns are attributed to a lack of infrastructure and maintenance.<sup>1790</sup> The City recognises that the latter issues have been caused by a lack of direct infrastructure departmental or municipal entities coordination, as well as planning for the short and medium-term.<sup>1791</sup> With this in mind, the following results have been established regarding the City's performance in terms of the abovementioned duties in relation to the challenges of non-revenue water, illegal water connections, insufficient data, and the sustainability of water services provision:

#### *4.5.1.1 Non-revenue water: include an audit in the annual water services report*

In response to the duty to provide a water services audit in its annual report,<sup>1792</sup> the CoJ has fared well. The latest annual report includes detailed information on water service delivery levels, water use, and access rates, and encompasses detailed figures concerning the financial performance of the water services department of the City.<sup>1793</sup> The financial performance section provides figures for the 2016/2017, 2017/2018 and the 2018/2019 financial years.<sup>1794</sup> Moreover, extensive information is included on the capital expenditure of the CoJ regarding its water, sanitation and wastewater services.<sup>1795</sup> As such, one may conclude that the CoJ has fulfilled its duty in this instance.<sup>1796</sup>

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<sup>1787</sup> The CoJ *Annual Report 2017/2018* 26.

<sup>1788</sup> The CoJ *Annual Report 2017/2018* 27.

<sup>1789</sup> The CoJ *Annual Report 2017/2018* 27.

<sup>1790</sup> The CoJ *Annual Report 2017/2018* 28.

<sup>1791</sup> The CoJ *Annual Report 2017/2018* 28.

<sup>1792</sup> Reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1793</sup> The CoJ *Annual Report 2018/2019* 65 – 72.

<sup>1794</sup> The CoJ *Annual Report 2018/2019* 72 – 73.

<sup>1795</sup> The CoJ *Annual Report 2018/2019* 73 – 76.

<sup>1796</sup> For full details on the financial performance as well as the Auditor-General's report on the City, see the *The CoJ Annual Report 2018/2019* chapters 5 – 6.

*4.5.1.2 Non-revenue water: include water conservation and demand management measures in water services development plans*

According to the SFWS, all water services institutions must develop an appropriate water conservation and water demand management strategy that must be reflected in the water services development plan of the relevant institution.<sup>1797</sup> As per the most recently available water services development plan of the CoJ for the 2014/2015 financial year, conservation and demand management measures are indicated for both urban settlements and rural settlements.<sup>1798</sup> The measures include reducing unaccounted water and water inefficiencies, which entails night and day flow metering, reticulation leaks, illegal connections, and unmetered connections.<sup>1799</sup>

Further measures include reducing high pressures for residential consumers, as well as leak and meter repair programmes. The latter programmes are listed as the leak repair assistance programme, the retro-fitting of water inefficient toilets, as well as the meter repair programme.<sup>1800</sup> Consumer or end-user demand management measures focused on public information and education programmes such as targeting schools with educational programmes and targeting consumers with public information programmes are also included in the City's water services development plan.<sup>1801</sup> The last measure listed in the plan entails the conjunctive use of surface and groundwater.<sup>1802</sup> The analysis of the implementation of these measures in the plan indicates that all of these measures are indeed in place.<sup>1803</sup> As such, the City scored an 80% assessment rate in this regard.<sup>1804</sup> Consequently, one may conclude that the CoJ succeeded in fulfilling the relevant duty provided for by the SFWS.

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<sup>1797</sup> The SFWS 40.

<sup>1798</sup> To view the full extent of the measures and enabling factors provided in the plan, see the CoJ *Water Services Development Plan 2015* 34 -40.

<sup>1799</sup> The CoJ *Water Services Development Plan 2015* 34.

<sup>1800</sup> The CoJ *Water Services Development Plan 2015* 34.

<sup>1801</sup> The CoJ *Water Services Development Plan 2015* 34.

<sup>1802</sup> The CoJ *Water Services Development Plan 2015* 34.

<sup>1803</sup> The CoJ *Water Services Development Plan 2015* 36 – 37.

<sup>1804</sup> The CoJ *Water Services Development Plan 2015* 36 – 37.

#### 4.5.1.3 *Illegal water use: create bylaws on the prevention of unlawful connections*

Section 21(1)(g) of the *WSA* requires that every water services authority must create bylaws which address issues such as the prevention of unlawful connections to water services works, and the unlawful or wasteful use of water. In 2004, the CoJ adopted a Water Services Bylaw, which covers a wide variety of issues, including the unauthorised use of water services.<sup>1805</sup> Section 18(1) of the latter bylaw stipulates that<sup>1806</sup> –

No person may gain access to water services from the water supply system, sewage disposal system or any other sanitation services unless an agreement has been entered into with the Council for the rendering of those services.

The bylaw text also makes provision for the interference with the water supply system or any sanitation services in terms of section 20.<sup>1807</sup> As such, it states that no person may operate or maintain any part of the water supply system, effect a reconnection or connection to the water supply system unless in any such case the person has been authorised to do so.<sup>1808</sup> The bylaw continues by prohibiting anyone to interfere with, negligently or wilfully damage, allow damage to or interference with any part of either the water supply or sanitation system belonging to the municipal council.<sup>1809</sup> Finally, section 45 of the CoJ's water services bylaw prohibits the wastage of water and states, *inter alia*, that no consumer may permit the wasteful or purposeless discharge of water from terminal water fittings, or allow a wasteful use of water to persist.<sup>1810</sup> With the above in mind, one may conclude that the CoJ has successfully fulfilled its duty in terms of section 21(1)(g) of the *WSA*.

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<sup>1805</sup> S 18 in LAN 835 in GPG 179 of 21 May 2004.

<sup>1806</sup> S 18(1) in LAN 835 in GPG 179 of 21 May 2004.

<sup>1807</sup> S 20 in LAN 835 in GPG 179 of 21 May 2004.

<sup>1808</sup> S 20(1) in LAN 835 in GPG 179 of 21 May 2004.

<sup>1809</sup> S 20(2) in LAN 835 in GPG 179 of 21 May 2004.

<sup>1810</sup> See ss 45(1)(a) – (e) in LAN 835 in GPG 179 of 21 May 2004. The bylaw further stipulates that an owner must repair or replace any part of a water installation that is in a state of disrepair and is causing, or is likely to cause the wastage of water; see s 45(2) in LAN 835 in GPG 179 of 21 May 2004.



#### *4.5.1.4 Illegal water use: indicate the quantity of unaccounted for water in water services audits*

A water services authority should provide details for the previous financial year and, if available, comparative figures for the preceding two financial years of water conservation and demand management, including at least the total quantity of water unaccounted for.<sup>1811</sup> This section seeks to determine whether the CoJ has included, at the very least, the total quantity of water unaccounted for in its water audit. The CoJ, in its latest annual report, indicated water unaccounted for as part of a graph portraying the water use by sector.<sup>1812</sup> While no key is provided for the interpretation of the latter graph, upon interpretation, it seems to indicate that 17 cubic meters of water is unaccounted for.<sup>1813</sup> No further mention is made regarding unaccounted water in the report.<sup>1814</sup> Thus, although the CoJ technically fulfilled its legislative duty in this regard, the information is provided in an unclear manner. The Regulations do not stipulate any specific requirements for the representation of the total quantity of water unaccounted for, yet one may assume that the quantity must, at the minimum, be reflected accurately.

#### *4.5.1.5 Insufficient data: furnish information to National Information Systems*

Section 69 of the *WSA* essentially provides that the Minister of Water and Sanitation may require any province, water services institution or consumer to furnish information for the National Information System. Generally, the data that is collected should enable the implementation, development, and monitoring of national water policy, and should also enable one to monitor the performance of water services institutions, for research or any other lawful reason.<sup>1815</sup> According to the DWS, the so-called National Information System envisioned by the *WSA* has been replaced with the NWSKS. The NWSKS is said to contain

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<sup>1811</sup> Reg 10(2)(g)(ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1812</sup> The CoJ *Annual Report 2018/2019* 66.

<sup>1813</sup> It is unclear whether 17 cubic meters is accurate, or if the graph failed to state that the cubic meters should be read in hundreds or thousands; see the CoJ *Annual Report 2018/2019* 66.

<sup>1814</sup> The CoJ *Annual Report 2018/2019* 66.

<sup>1815</sup> S 68 of the *WSA*.

water services authority-level information regarding demography, basic service backlogs and progress, financial perspectives, projects, and free basic services.

At the hand of the above, this section aims to determine whether the CoJ has contributed to the NWSKS, as may reasonably be expected of the City. Upon evaluation of the NWSKS as it pertains to the CoJ, the system contained information on the demography, water services programmes, institutional effectiveness, financial issues, census results, access to basic services, water quality management, water conservation and demand management, protest hotspots and waterboards of the City.<sup>1816</sup> Out of the ten latter themes, only three were up to date (that is, the year 2020).<sup>1817</sup> These themes include demography facts and figures, access to basic services via infrastructure data, and water quality management.<sup>1818</sup>

Since it is only necessary for cities to make the data available upon request of the Minister,<sup>1819</sup> one may conclude that the City has fulfilled its duty, but it is uncertain to what extent. This is so, because no access is provided to the request for data made by the Minister to the City. One may argue that this is a potential pitfall of the NWSKS, since the legislation does not directly require cities to continuously, and as far as is reasonably possible, provide updated data.

This may be viewed as compromising to the purpose of the NWSKS.<sup>1820</sup> For instance, information on the waterboards of the CoJ and water conservation and demand management data, dates as far back as 2014 and 2012 respectively. In this regard, it is questionable to what extent one could, for instance, accurately monitor the performance of the water services institution (as envisioned by the *WSA*)<sup>1821</sup> if the data is between six to eight years old.<sup>1822</sup>

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<sup>1816</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1817</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1818</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1819</sup> S 69 of the *WSA*.

<sup>1820</sup> See para 4.4.3 above; s 68 of the *WSA*.

<sup>1821</sup> S 68 of the *WSA*.

<sup>1822</sup> See para 4.4.3 above.

#### *4.5.1.6 Insufficient data: provide feedback on the implementation of free basic water*

According to the *Free Basic Water Implementation Strategy* of 2007, municipalities are required to provide *regular* feedback on their implementation of free basic water in the community.<sup>1823</sup> This information must be provided to the DWS,<sup>1824</sup> but is also essential for municipalities to make informed decisions, as well as for communities to be informed as to the progress made by the municipality in this regard. The annual reports of the CoJ have been recognised as providing updates concerning the implementation of free basic water in the community. For instance, the 2018/2019 report indicates that, via a graph, the implementation progress of all free basic household services in the CoJ, including water services.<sup>1825</sup> There is an observable variance between the yearly implementation of free basic water; in the 2018/2019 year approximately 48 000 households were provided with free basic water, versus the nearly 88 000 households in 2017/2018.<sup>1826</sup> Nevertheless, one may conclude that the CoJ has fulfilled its duty in terms of the abovementioned Strategy.

#### *4.5.1.7 The sustainability of water services: enhance revenue collection*

The SFWS generally sets out that to improve and secure the sustainability of services, water services authorities must enhance revenue collection and improve consumer management. As such, this section will look at the revenue collection levels and figures of the CoJ, specifically. Upon investigating the revenue of the City, it was found that great focus is placed on the financial sustainability of the CoJ, and thus also on revenue collection.<sup>1827</sup> For the 2017/2018 financial year, the target for revenue collection was set at R335 million, and the actual collection of revenue yielded R352 million for the City.<sup>1828</sup> Moreover, the revenue target for the 2018/2019 financial year was again set at R335 million, while the actual revenue collected amounted to R538 million.<sup>1829</sup> The latter may

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<sup>1823</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1824</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1825</sup> The CoJ *Annual Report 2018/2019* 92.

<sup>1826</sup> The CoJ *Annual Report 2018/2019* 92.

<sup>1827</sup> See generally the CoJ *Annual Report 2018/2019*.

<sup>1828</sup> The CoJ *Annual Report 2018/2019* 263.

<sup>1829</sup> The CoJ *Annual Report 2018/2019* 263.

be regarded as a significant increase in revenue collection, and one may reasonably conclude that the Municipality is performing well in terms of its duty to enhance revenue.

#### *4.5.1.8 The sustainability of water services: invest in climate-resilient infrastructure*

This final section seeks to evaluate the performance of the CoJ in terms of the newly adopted NCCAS, which requires municipalities to invest in high-quality, climate-resilient, eco-sustainable, reduced impact public infrastructure and materials.<sup>1830</sup> While the NCCAS may be a new development, climate change has been on the table for the CoJ for many years. As such, the City has developed a *Climate Change Strategic Framework* which covers, *inter alia*, the issue of climate-resilient infrastructure.<sup>1831</sup>

As part of the CoJ's commitment to climate change action, a mandate has been directed to the Environment and Infrastructure Services Department (hereafter EISD) to develop strategies and policies, as well as monitor and ensure compliance in the City.<sup>1832</sup> Thus far, the City has committed itself to enhance the resilience of the community by adapting infrastructure, among others.<sup>1833</sup> The City notes the impact climate change may have on infrastructure and highlights its strong focus on public transport and access to mobility in support of sustainable development and resilience.<sup>1834</sup> The "Rea Vaya" bus rapid transit system offers safe, affordable and fast public transport in the CoJ, and aids in reducing the Municipality's carbon footprint resultant from transport.<sup>1835</sup> In terms of climate adaptation, the CoJ is also committed to enhancing the resilience of communities and infrastructure to heatwave events resultant from the anticipated warmer climate.<sup>1836</sup> Moreover, the Strategic Framework holds that:<sup>1837</sup>

The City plans to lead in the establishment of sustainable and eco-efficient infrastructure solutions (e.g. housing, eco-mobility, energy, water, waste, sanitation and information and communications technology), to create a landscape that is liveable, environmentally resilient, sustainable, and supportive of low-carbon economy initiatives.

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<sup>1830</sup> The NCCAS 30.

<sup>1831</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 6.

<sup>1832</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 6.

<sup>1833</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 7.

<sup>1834</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 25.

<sup>1835</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 25.

<sup>1836</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 25.

<sup>1837</sup> The *Climate Change Strategic Framework: City of Johannesburg* 2015 31.

From the above, one may reasonably conclude that the CoJ is already performing well in terms of complying with the duty set out by the NCCAS.

#### ***4.5.2 eThekweni Metropolitan Municipality***

eThekweni Metropolitan Municipality (hereafter, eMM) is the largest City in the Kwazulu-Natal province, and the 3<sup>rd</sup> largest city in South Africa.<sup>1838</sup> The eMM describes itself as a sophisticated, cosmopolitan city with a population of approximately 3.4 million people.<sup>1839</sup> The City is home to Africa's busiest port and is a major tourism centre due to its extensive beaches and subtropical climate.<sup>1840</sup> The eMM, like most other cities in South Africa, experiences major service delivery challenges. Some of these challenges include a lack of bulk infrastructure and services sites to support the development of human settlements, increased extreme weather events that damage infrastructure, dense informal settlements, as well as non-revenue water and electricity loss.<sup>1841</sup> Nevertheless, the City reports that nearly 85% of its residents have access to clean water, and 65% have access to electricity.<sup>1842</sup> As such, the eMM states that it is moving speedily to eradicate the vestiges of Apartheid.<sup>1843</sup>

##### *4.5.2.1 Non-revenue water: include an audit in the annual water services report*

The eMM, in regards to the duty to provide a water services audit in its annual report,<sup>1844</sup> delivered an extensive report that approaches the audit in a systematic manner. First, the report sets out to provide details on the actual performance of the municipality in terms of the provision of basic services, such as a basic access to water.<sup>1845</sup> The annual report entails a detailed section on the financial performance of the eMM,<sup>1846</sup> followed by a report from the Auditor-General and a response from management.<sup>1847</sup> The financial

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<sup>1838</sup> The eMM 2011 [http://www.durban.gov.za/Discover\\_Durban/Pages/AboutEM.aspx](http://www.durban.gov.za/Discover_Durban/Pages/AboutEM.aspx).

<sup>1839</sup> The eMM 2011 [http://www.durban.gov.za/Discover\\_Durban/Pages/AboutEM.aspx](http://www.durban.gov.za/Discover_Durban/Pages/AboutEM.aspx).

<sup>1840</sup> The eMM 2011 [http://www.durban.gov.za/Discover\\_Durban/Pages/AboutEM.aspx](http://www.durban.gov.za/Discover_Durban/Pages/AboutEM.aspx).

<sup>1841</sup> The eMM *Annual Report 2018/2019* 75 – 76.

<sup>1842</sup> The eMM *Annual Report 2018/2019* 26.

<sup>1843</sup> The eMM *Annual Report 2018/2019* 26.

<sup>1844</sup> Reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1845</sup> See the eMM *Annual Report 2018/2019* 83.

<sup>1846</sup> See the eMM *Annual Report 2018/2019* 368 – 412.

<sup>1847</sup> The eMM *Annual Report 2018/2019* chapter 6.

performance section of the report states that some of the key expenditure challenges for the municipality includes ageing infrastructure, the service delivery backlog, and high bulk tariff increases.<sup>1848</sup>

Furthermore, the report provides detailed financial performance statements, covering issues such as service charges, capital expenditure and funds sources, asset management, free basic services, households that are below the minimum water service level, and grant performances.<sup>1849</sup> The eMM also provides details concerning basic service and infrastructure backlogs overviews.<sup>1850</sup> Finally, the Auditor-General concludes that the information presents the financial position of the municipality fairly.<sup>1851</sup>

The Auditor-General does note that, in terms of material debt impairment and losses, the eMM incurred material water losses of 126.18 million kilolitres, amounting to revenue losses of R968 million.<sup>1852</sup> These losses represent a significant rise from previous years. The Auditor-General states that these losses are resultant from deteriorating and ageing infrastructure, in addition to illegal connections.<sup>1853</sup> One may conclude, however, that the eMM has duly fulfilled its duty in this instance to provide an audit in its report, specifically concerning its water services development plan.

#### *4.5.2.2 Non-revenue water: include water conservation and demand management measures in water services development plans*

As mentioned above,<sup>1854</sup> the SFWS requires of water services institutions to include water conservation and demand management strategies in their water services development plans. The latest available water services development plan of the eMM does, in fact, provide for conservation and demand management measures in its development plan.<sup>1855</sup>

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<sup>1848</sup> The eMM *Annual Report 2018/2019* 369.

<sup>1849</sup> The eMM *Annual Report 2018/2019* 375 – 384; 401, 403.

<sup>1850</sup> The eMM *Annual Report 2018/2019* 404.

<sup>1851</sup> The eMM *Annual Report 2018/2019* 413.

<sup>1852</sup> The eMM *Annual Report 2018/2019* 414.

<sup>1853</sup> The eMM *Annual Report 2018/2019* 414.

<sup>1854</sup> See para 4.5.1.2 above.

<sup>1855</sup> The eMM *Water Services Development Plan 2015* 34.

Notably, the aspects covered in the eMM water services development are identical to those provided for in the CoJ development plan.<sup>1856</sup>

However, whereas the CoJ scored an 80% in its assessment of the implementation of these water conservation and demand management measures, the eMM plan, on the other hand, indicates that nearly none of these measures have been set in place, except for the reticulation of leaks and illegal connections aspects.<sup>1857</sup> In the latter case, the City provided itself with 20 points in this regard, leaving it with an implementation rate of 8% in terms of reduction of unaccounted water and water inefficiencies.<sup>1858</sup> The rest of the implementation measures are largely rated at 0% implementation.<sup>1859</sup> Given the above, while the water services development plan of the eMM does include measures for water conservation and demand management, at the time that the plan was generated in 2017, it was indicated that almost none of these measures have been implemented. Thus, while technically the eMM has fulfilled the duty provided for in the SFWS, the City made no substantive effort to fulfil the conservation and demand management strategies, at least according to the plan currently being scrutinised.

#### *4.5.2.3 Illegal water use: create bylaws on the prevention of unlawful connections*

The duty in this regard entails that every water services authority must make bylaws that address issues such as the prevention of unlawful connections to water services works, and the unlawful or wasteful use of water, as per section 21(1)(g) of the *WSA*. The eMM established a water supply bylaw in 1996, and in accordance with the latter duty, the text provides for the prohibition of the unauthorised use of water<sup>1860</sup> as well as the waste of water.<sup>1861</sup> Section 18 simply states that no person is allowed to take water either from the water supply system (except through a communication pipe provided) or from a hydrant.<sup>1862</sup>

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<sup>1856</sup> See para 4.5.1.2 above.

<sup>1857</sup> The eMM *Water Services Development Plan 2015* 36 – 37.

<sup>1858</sup> The eMM *Water Services Development Plan 2015* 36.

<sup>1859</sup> The eMM *Water Services Development Plan 2015* 36 – 37.

<sup>1860</sup> S 18 in MN 104 in KZNPG 5157 of 26 September 1996.

<sup>1861</sup> Chapter 7 s 1 in MN 104 in KZNPG 5157 of 26 September 1996.

<sup>1862</sup> S 18 in MN 104 in KZNPG 5157 of 26 September 1996.

As per section 1 of chapter 7 of the bylaw, it is held that no consumer may permit: wasteful or purposeful discharge of water from terminal water fittings, pipes or fittings to leak, the use of maladjusted or defective tap fittings, an overflow of water to continue, or an inefficient use of water to persist.<sup>1863</sup> A consumer must also repair or replace any part of a water installation to prevent the occurrence of the aforementioned wastage of water.<sup>1864</sup> Therefore, one may confidently conclude that the eMM has fulfilled its duty according to section 21(1)(g) of the *WSA*.

#### *4.5.2.4 Illegal water use: indicate the quantity of unaccounted for water in water services audits*

In accordance with the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water*, the water services audit of a water services authority must contain details for the previous financial year and, if available, comparative figures for the preceding two financial years of water conservation and demand management, including at least the total quantity of water unaccounted for.<sup>1865</sup> The focus in this regard remains on determining whether the City at hand has provided for, at least, the total quantity of water unaccounted for in its annual water audit. The Auditor-General report included in the annual report for the eMM indicated that the City incurred material water losses of 126.18 million kilolitres (compared to 105.22 million kilolitres in the 2017/2018 year).<sup>1866</sup> This resulted in revenue losses of R968 million, compared to the R714 million for the 2017/2018 year.<sup>1867</sup> As such, a significant increase in unaccounted for water has been recorded between the two financial years. The report states that these losses may be due to deteriorating and ageing infrastructure and illegal water connections.<sup>1868</sup> Given this information, one may conclude that the eMM has successfully fulfilled the relevant duty in terms of the Regulations.

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<sup>1863</sup> Chapter 7 s 1 in MN 104 in KZNPG 5157 of 26 September 1996.

<sup>1864</sup> Chapter 7 s 2 in MN 104 in KZNPG 5157 of 26 September 1996.

<sup>1865</sup> Reg 10(2)(g)(ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1866</sup> The eMM *Annual Report 2018/2019* 414.

<sup>1867</sup> eMM *Annual Report 2018/2019* 414.

<sup>1868</sup> eMM *Annual Report 2018/2019* 414.



#### *4.5.2.5 Insufficient data: furnish information to National Information Systems*

With reference to the similar analyses performed for the CoJ above,<sup>1869</sup> this section seeks to determine whether the eMM has provided data or information, upon the request of the Minister, to the now NWSKS. An analysis of the NWSKS as it relates to the eMM proved that the City has provided updated data in 2020 concerning their demography facts and figures, access to basic services, and water quality management.<sup>1870</sup> In 2019, the City provided information concerning their financial situation, specifically the water tariffs in the area.<sup>1871</sup> While the City provided data on the same ten themes as discussed above,<sup>1872</sup> it also appears to have outdated data on the remaining themes, ranging from 2011 to 2018.<sup>1873</sup>

As such, the City has fulfilled its duty. What remains unclear is whether this indicates that the Minister has not requested updated information from these cities, or the cities do not have sufficient data available on these themes. Although it seems reasonable to assume that the former is true given the wording of the legislative duty, it is not unfair to interrogate whether the latter may be the case.

#### *4.5.2.6 Insufficient data: provide feedback on the implementation of free basic water*

As per the *Free Basic Water Implementation Strategy* of 2007, municipalities must provide *regular* feedback on their implementation of free basic water in the community.<sup>1874</sup> In the above similar section, the annual reports of the CoJ were used as a measure to determine whether the City has succeeded in this duty.<sup>1875</sup> Likewise, the eMM has provided information concerning both the targets and actual implementation on free basic water in the municipal area.<sup>1876</sup> This information states that whereas the annual target for 2018/2019 was 7500 consumer units with access to at least free basic water, the actual

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<sup>1869</sup> See para 4.5.1.5 above.

<sup>1870</sup> The DWS 2020 <http://ws.dwa.gov.za/wsks/>.

<sup>1871</sup> The DWS 2020 <http://ws.dwa.gov.za/wsks/>.

<sup>1872</sup> See para 4.5.1.5 above.

<sup>1873</sup> The DWS 2020 <http://ws.dwa.gov.za/wsks/>.

<sup>1874</sup> The *Free Basic Water Implementation Strategy* 2007 29.

<sup>1875</sup> See para 4.5.1.6 above.

<sup>1876</sup> The eMM *Annual Report 2018/2019* 692.

implementation yielded the provision of 13 055 units.<sup>1877</sup> The installations exceeded the expectations of the City, and one may conclude that the eMM is making great strides towards securing free basic water for the community, and are also performing well in terms of their reporting duty in this regard.

#### *4.5.2.7 The sustainability of water services: enhance revenue collection*

The duty to be analysed in this section stems from the SFWS, which requires water services authorities to enhance revenue collection so as to improve the sustainability of water services provision.<sup>1878</sup> By analysis of the annual report of the eMM, it was possible to determine the performance of the Municipality in this regard. For the 2018/2019 year, the report provides for the revenue collection by source as R35.23 million as per the original budget, and R34.84 million in terms of actual revenue collected.<sup>1879</sup> Overall, the report suggests that the Municipality is collecting less revenue than anticipated.<sup>1880</sup> Therefore, for the 2018/2019 year, one may conclude that the eMM has not performed well in terms of its duty to enhance revenue collection.

#### *4.5.2.8 The sustainability of water services: invest in climate-resilient infrastructure*

As mentioned above, this last section seeks to determine the performance of the City according to the NCCAS, which requires municipalities to invest in high-quality, climate-resilient, eco-sustainable, reduced impact public infrastructure and materials.<sup>1881</sup> The eMM has made great strides in this instance, given it has adopted both a *Resilience Strategy*<sup>1882</sup> as well as the *Durban Climate Change Strategy*.<sup>1883</sup> One of the main goals of the latter *Climate Change Strategy* includes designing waste infrastructure appropriately to adapt to the impacts of climate change,<sup>1884</sup> while explicitly stating that the City must invest in systems to increase the resilience of infrastructure against extreme weather events.<sup>1885</sup>

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<sup>1877</sup> The eMM *Annual Report 2018/2019* 692.

<sup>1878</sup> The SFWS 15.

<sup>1879</sup> The eMM *Annual Report 2018/2019* 584.

<sup>1880</sup> The eMM *Annual Report 2018/2019* 583 – 584.

<sup>1881</sup> The NCCAS 30.

<sup>1882</sup> The *Durban Resilience Strategy* 2017.

<sup>1883</sup> The *Durban Climate Change Strategy* 2014.

<sup>1884</sup> The *Durban Climate Change Strategy* 2014 iv.

<sup>1885</sup> The *Durban Climate Change Strategy* 2014 6.

Responses should include the adaptation of infrastructure and buildings to respond to climate changes, which includes green buildings.<sup>1886</sup> The *Resilience Strategy* notes that services and infrastructure are resilience issues, and states that:<sup>1887</sup>

An alternative and more resilient approach to the delivery of housing would shift the focus away from the provision of formal housing to facilitating a better living experience for informal communities, through concerted investment in the public realm (such as improved services, formal roads, formal pedestrian paths, street lighting, waste management facilities and storm water infrastructure) and social facilities (such as schools and clinics).

In addition to services, infrastructure and housing, the *Resilience Strategy* also notes the importance of enhancing ecological infrastructure.<sup>1888</sup> While the City has a long way to go in terms of the duty set out by the NCCAS, it has already recognised the duty as necessary even before the adoption thereof.

#### **4.5.3 Nelson Mandela Bay Metropolitan Municipality**

The Nelson Mandela Bay Metropolitan Municipality (NMBMM) is located on the southern coast of South Africa and has an estimated population of 1.23 million.<sup>1889</sup> The City is one of only two metropolitan municipalities in the Eastern Cape province and has approximately 349 257 households.<sup>1890</sup> An estimated 27.12% of these households are impoverished.<sup>1891</sup>

In terms of access to water services, 97.68% of households in formal human settlements have access to at least a basic level of water supply, which includes households within a 200 metre radius of a standpipe.<sup>1892</sup> The NMBMM also reports that, except for communities that occupy private land illegally, all alternative informal settlements obtain water supply via standpipes and water tanks.<sup>1893</sup> To address this, the City is assessing the extent of water services backlogs in newly established informal settlements.<sup>1894</sup> The Municipality

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<sup>1886</sup> The *Durban Climate Change Strategy* 2014 13.

<sup>1887</sup> The *Durban Resilience Strategy* 2017 72.

<sup>1888</sup> The *Durban Resilience Strategy* 2017 100.

<sup>1889</sup> The NMBMM *Annual Report 2018/2019* 6.

<sup>1890</sup> The NMBMM *Annual Report 2018/2019* 6.

<sup>1891</sup> The NMBMM *Annual Report 2018/2019* 6.

<sup>1892</sup> The NMBMM *Annual Report 2018/2019* 7.

<sup>1893</sup> The NMBMM *Annual Report 2018/2019* 7.

<sup>1894</sup> The NMBMM *Annual Report 2018/2019* 7.

further reports that it grapples with many challenges, specifically water and electricity losses, billing challenges, maintenance backlogs, as well as water and sanitation provision backlogs.<sup>1895</sup>

Perhaps the most significant challenge that the Municipality is facing at the moment is its dam levels plummeting below 19%, which forced the NMBMM to announce "Day Zero".<sup>1896</sup> This announcement followed after a series of prolonged water outages in the municipal area.<sup>1897</sup> The City observes that Day Zero finally came after the water consumption and demand in the area has, for far too long, exceeded water availability.<sup>1898</sup> The reported daily consumption in the NMBMM is 290 million litres per day, whereas the maximum recommended use is 268 million litres or less.<sup>1899</sup> Given this, the current water situation in the City may reasonably be described as being in a dire state. One may argue that it is now more prudent than ever for the City to carefully observe its legislative duties, both in terms of water resource management and water provision.

#### *4.5.3.1 Non-revenue water: include an audit in the annual water services report*

As per the duty to provide a water services audit in its water services development plan report,<sup>1900</sup> the NMBMM included extensive details pertaining to the priority areas identified in the plan. This includes full financial details, such as the financial performance of the City's water services for the 2017/2018 and 2018/2019 financial years.<sup>1901</sup> The report encompasses details on the capital expenditure of the water services, e.g., pipe rehabilitation and improvements, reservoir fencing, the installation of zone water meters,

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<sup>1895</sup> The NMBMM *Annual Report 2018/2019* 4.

<sup>1896</sup> Day Zero was announced on the 4<sup>th</sup> of September 2020; see NMBMM 2020 <https://www.nelsonmandelabay.gov.za/newsitem?id=2790>.

<sup>1897</sup> See NMBMM 2020 <https://www.nelsonmandelabay.gov.za/newsitem?id=2790>; GroundUp 2020 <https://www.groundup.org.za/article/day-zero-water-stricken-mandela-bay/#:~:text=Nelson%20Mandela%20Bay%20has%20declared,use%20only%20water%20for%20essentials>.

<sup>1898</sup> GroundUp 2020 <https://www.groundup.org.za/article/day-zero-water-stricken-mandela-bay/#:~:text=Nelson%20Mandela%20Bay%20has%20declared,use%20only%20water%20for%20essentials>.

<sup>1899</sup> GroundUp 2020 <https://www.groundup.org.za/article/day-zero-water-stricken-mandela-bay/#:~:text=Nelson%20Mandela%20Bay%20has%20declared,use%20only%20water%20for%20essentials>.

<sup>1900</sup> Reg 10(1) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1901</sup> The NMBMM *Annual Report 2018/2019* 106.

telemetry equipment, advanced meter infrastructure, as well as bulk metering and control.<sup>1902</sup> As such, one may conclude that the City has observed its obligation in this regard.<sup>1903</sup>

#### *4.5.3.2 Non-revenue water: include water conservation and demand management measures in water services development plans*

As with the above analysis of the duty to provide water conservation and demand measures in water services development plans,<sup>1904</sup> the NMBMM plan provides for the same strategies as indicated in both the CoJ and eMM plans.<sup>1905</sup> The City's reduction of unaccounted water and water inefficiencies scored the lowest level of implementation at 44%, whereas water resource management (which includes leak and meter repair programmes) scored the highest, at 66.67%.<sup>1906</sup> Consequently, the NMBMM has succeeded in including water conservation and demand management strategies in its development plan (thus fulfilling the relevant duty by the SFWS),<sup>1907</sup> and is making good progress towards implementing these measures.

#### *4.5.3.3 Illegal water use: create bylaws on the prevention of unlawful connections*

The NMBMM has the duty to establish bylaws concerning the unauthorised use of water services as well as the wasteful use of water.<sup>1908</sup> As such, the City established a water and sanitation services bylaw in 2010 which comprehensively covers matters related to water service delivery in the city, as well as the issue of unauthorised or wasteful use.<sup>1909</sup> Section 24 of the bylaw specifically stipulates that no person may take water from the water supply system, unless otherwise authorised by the bylaw, such as authorised use from a hydrant.<sup>1910</sup> Section 65 of the bylaw prohibits the waste of water.<sup>1911</sup> One may, thus,

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<sup>1902</sup> The NMBMM *Annual Report 2018/2019* 107 – 108.

<sup>1903</sup> For comprehensive details on the financial performance and the Auditor-General's report, see the NMBMM *Annual Report 2018/2019* chapters 5 – 6.

<sup>1904</sup> See paras 4.5.1.2 and 4.5.2.2 above.

<sup>1905</sup> The NMBMM *Water Services Development Plan 2015* 33 – 36.

<sup>1906</sup> The NMBMM *Water Services Development Plan 2015* 35 – 36.

<sup>1907</sup> The SFWS 40.

<sup>1908</sup> S 21(1)(g) of the *WSA*.

<sup>1909</sup> See the Water and Sanitation Services Bylaw in LAN 57 in ECPG 2361 of 14 May 2010.

<sup>1910</sup> S 24(1)(a) – (b) in LAN 57 in ECPG 2361 of 14 May 2010.

<sup>1911</sup> The wording of this provision is largely similar to those in the bylaws of the CoJ and the eMM; see s 65(1) – (6) in LAN 57 in ECPG 2361 of 14 May 2010.

conclude that the NMBMM has, similar to the CoJ and the eMM, successfully fulfilled its duty under section 21(1)(g) of the *WSA*.

#### *4.5.3.4 Illegal water use: indicate the quantity of unaccounted for water in water services audits*

As has been stated by two similar preceding sections, the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* require that the water services audit of a water services authority must contain details for the previous financial year and, if available, comparative figures for the preceding two financial years of water conservation and demand management, including at least the total quantity of water unaccounted for.<sup>1912</sup> The annual report of the NMBMM contains figures pertaining to unaccountable water losses expressed in percentage values.<sup>1913</sup> The two previous fiscal years' unaccountable water losses were measured as 29.4% and 34.2% respectively, while the 2018/2019 year was measured at 32%.<sup>1914</sup> Therefore, the City has duly complied with the duty in question.

#### *4.5.3.5 Insufficient data: furnish information to National Information Systems*

This section refers to the content provided on the duty in similar sections above,<sup>1915</sup> namely that it is subject to determining whether the NMBMM has provided any information to the NWSKS. Upon analysing the system, it appears that the City has provided information for nine out of the ten previously stipulated themes, with the three same themes (namely the demography, access to services, and water quality management) having been updated in 2020.<sup>1916</sup> The Municipality failed to provide information on its water boards, but the year of provision for the remaining themes largely

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<sup>1912</sup> Reg 10(2)(g)(ii) of the *Regulations Relating to Compulsory National Standards and Measures to Conserve Water* GN R509 in GG 22355 of 8 June 2001.

<sup>1913</sup> The NMBMM *Annual Report 2018/2019* 100.

<sup>1914</sup> The NMBMM *Annual Report 2018/2019* 100.

<sup>1915</sup> See paras 4.5.1.5 and 4.5.2.5 above.

<sup>1916</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>. See also para 4.5.1.5 above.

align with the CoJ and the NMBMM.<sup>1917</sup> As such, the City has performed its duty, but has failed to do so completely in at least one respect.<sup>1918</sup>

Finally, one may also reasonably conclude that there have been no requests from the Minister concerning updated information for all of the themes, even though cities may have information to produce. This may be deduced given that the dates of the information provided are aligned, including the dates of the outdated information.<sup>1919</sup> This supports the argument that such actions, which result in outdated information being provided on the national system, compromises the ultimate legislative purpose of the NWSKS.<sup>1920</sup>

#### *4.5.3.6 Insufficient data: provide feedback on the implementation of free basic water*

The content set out in the preceding similar section refers.<sup>1921</sup> This section seeks to establish whether the *NMBMM* is regularly reporting on the implementation of free basic water in the community. With reference to the annual report of the 2018/2019 year of the City, ample data is provided on the implementation of free basic water in the City.<sup>1922</sup> The report compares figures dating back from 2014/2015 to 2018/2019, where the implementation levels are stated as 88.85% and 91.04% respectively.<sup>1923</sup> Considering this, the NMBMM may be regarded as performing well in terms of their free basic water-reporting duty.

#### *4.5.3.7 The sustainability of water services: enhance revenue collection*

The duty in this instance concerns the SFWS requiring municipalities to enhance their revenue in order to improve the sustainability of services.<sup>1924</sup> As with the previous similar sections, the most recent annual report of the NMBMM will be utilised to determine the performance of the City regarding the latter duty. The Municipality, as per its performance scorecard, indicates that for the 2017/2018 year, the target was to obtain 94% revenue

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<sup>1917</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>. See also paras 4.5.1.5 and 4.5.2.5 above.

<sup>1918</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1919</sup> The DWS 2020 <http://ws.dwa.gov.za/wsk/>.

<sup>1920</sup> See paras 4.5.1.5, 4.5.2.5 and 3.3.3 above; S 68 of the *WSA*.

<sup>1921</sup> See paras 4.5.1.6 and 4.5.2.6 above.

<sup>1922</sup> The NMBMM *Annual Report 2018/2019* 143.

<sup>1923</sup> The NMBMM *Annual Report 2018/2019* 143.

<sup>1924</sup> The SFWS 15.

collection, while the actual figures reveal 93.10% of revenue collected.<sup>1925</sup> On a similar trend, the 2018/2019 target was set at 95%, whereas the actual revenue collected was 94.70%.<sup>1926</sup> Accordingly, the previous two financial years' records reveal that the NMBMM has not performed well in enhancing its revenue collection, yet there is no major deviation from its targets.<sup>1927</sup>

#### *4.5.3.8 The sustainability of water services: invest in climate-resilient infrastructure*

In terms of the duty determined by the NCCAS which requires municipalities to invest in high-quality, climate-resilient, eco-sustainable, reduced impact public infrastructure and materials,<sup>1928</sup> the NMBMM has already made some progress. This is made evident by its adoption of the 2015 *Climate Change and Green Economy Action Plan*. The City states that this green economy action plan entails the restructuring of business, infrastructure and institutions towards more sustainable and green production, procurement, consumption and distribution processes.<sup>1929</sup> The latter is said to create new economic opportunities and jobs in the process.<sup>1930</sup>

In terms of infrastructure, the Plan suggests that a key intervention is the development of infrastructure that will be more resilient to both droughts and floods.<sup>1931</sup> As such, the Plan includes a detailed section on green buildings and infrastructure, highlighting short, medium and long-term tasks.<sup>1932</sup> Furthermore, the Plan provides that the demolition and relocation of municipal infrastructure that is the most vulnerable to climate change is the most successful form of adaptation, yielding the best potential to avoid risk and high costs.<sup>1933</sup> Although the envisioned climate change responses in this regard are still being implemented, the NMBMM may be considered as having made significant progress towards eventually fulfilling the infrastructure-related duty envisioned by the NCCAS.

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<sup>1925</sup> The NMBMM *Annual Report 2018/2019* 253.

<sup>1926</sup> The NMBMM *Annual Report 2018/2019* 253.

<sup>1927</sup> The NMBMM *Annual Report 2018/2019* 253.

<sup>1928</sup> The NCCAS 30.

<sup>1929</sup> The *Nelson Mandela Bay Climate Change and Green Economy Action Plan* 2015 4.

<sup>1930</sup> The *Nelson Mandela Bay Climate Change and Green Economy Action Plan* 2015 4.

<sup>1931</sup> The *Nelson Mandela Bay Climate Change and Green Economy Action Plan* 2015 16.

<sup>1932</sup> The *Nelson Mandela Bay Climate Change and Green Economy Action Plan* 2015 29.

<sup>1933</sup> The *Nelson Mandela Bay Climate Change and Green Economy Action Plan* 2015 37.



## 4.6 Concluding remarks

The aim of this chapter was to investigate the rights, duties, and obligations flowing from the national law and policy framework in general, as it pertains to specific water service delivery challenges in South African cities and specific city governments, namely the CoJ, eMM, and the NMBMM. The chapter briefly discussed the general legal framework applicable to service delivery in South Africa,<sup>1934</sup> after which each instrument that is considered a part of the national legal framework on water service delivery was briefly introduced.<sup>1935</sup> By first identifying the instruments, it was then possible to identify the applicability thereof to specific city-level water provision challenges.<sup>1936</sup> From this analysis,<sup>1937</sup> one may glean that many of these duties overlap, repeat between challenges and are interrelated. One may confidently conclude that not only is the law on water services delivery extensive and intricate, but so are the duties expected from cities as the bearers of the water provision mandate.

With due consideration of the above legislative analysis and the precluding chapters, one may well conclude that cities are overwhelmed by the massive number of duties emanating from current water law. A counterargument could also be made that, more than 20 years since the establishment of a democratic South Africa with progressive and forward-thinking primary water laws, the latter should not excuse local governments from their constitutional mandate, particularly considering the nexus between the right to life, dignity and water. Ultimately, it becomes a question of whether the current level of decentralisation in water services provision and in the local levels of regulation is suitable, especially considering the perpetual capacity constraints faced in municipalities.

The chapter sought to determine whether cities are aware of and fulfil the obligations bestowed on them by national law.<sup>1938</sup> This investigation was deliberately scoped in two ways, namely, only three specific cities were examined, and for every water service delivery challenge, two duties were identified. In this way, it was reasonably possible to,

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<sup>1934</sup> See para 4.2 above.

<sup>1935</sup> See para 4.3 above.

<sup>1936</sup> See para 4.4 above.

<sup>1937</sup> See para 4.4 above.

<sup>1938</sup> See para 4.5 above.

based on a desktop review of the sources available on the cities' websites, determine the extent to which they adhere to the obligations expected from them.

This investigation was thus limited by the methodology employed, but from the review of the cities' fulfilment of their duties, certain findings may be extrapolated. While the cities in question, on average, met the duties against which their performance was measured, some duties were met only in the strictest sense of the word.<sup>1939</sup> Considering the limitations of this enquiry, however, it is not possible to say with certainty whether cities are capable of fulfilling *all* of the duties imposed on them. Due to the extent and intricacy of the relevant legal framework, it is doubtful whether cities, in general, are aware of all the instruments that apply to their water provision function, and even more so as to whether they are *capable* of complying with all of these obligations.

However, it became evident that assessing the performance of a city's obligations by analysing its water services development plan is not only possible, but it serves as a reflection of the city's progress concerning their water provision function. As such, one may conclude that establishing an adequate and thorough water services development plan is essential for the city to continuously move in the right direction and could be used as a barometer of the city's success on many aspects of the water provision process. Information on a city's performance is central to establishing what still needs to be done, developed and planned for. Cities should be encouraged to learn from one another, and enhance their means of obtaining accurate and up-to-date information on their own performance. This could be done by employing innovation and technology.

A specific gap that one may deduce from the investigation of the relevant laws in this chapter is that, with minor exceptions, overall, the legislation, strategies, policies and plans tend to use the term "information" rather than "data" in relevant sections. Considering the troubling use of data, the lack of integrity, and lack of data quality in, for instance, national databases,<sup>1940</sup> one may reason that more can be done by national law for instance, to promote awareness of the difference between information and data, the

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<sup>1939</sup> See para 4.5.1 – 4.5.3 above.

<sup>1940</sup> See para 3.3.3 above.

pitfalls of utilising data of poor quality and integrity, as well as establishing regulations on capturing, processing and storing data.

The next chapter considers intelligent water management technologies as a means of addressing specific water service delivery challenges towards ultimately realising the constitutional water right.

# CHAPTER 5 THE PROMISE OF INTELLIGENT WATER MANAGEMENT TECHNOLOGIES

## 5.1 Introduction

Earlier in this study, it was stated that local governments' function to provide water services to their communities entails many challenges.<sup>1941</sup> Previous chapters of this study aimed to provide an in-depth understanding of four specific challenges, namely non-revenue water, illegal water connections, insufficient data, the sustainability of water services, and how they are regulated in the South African water law.<sup>1942</sup> While it was found that laws and rules exist that govern these challenges, and that cities (specifically the CoJ, the eMM, and the NMBMM) fulfil the legislative duties associated with these challenges, it is argued that cities need to do more to address these specific challenges.<sup>1943</sup> A failure to do so may compromise the constitutional water right. This is because these challenges affect cities' ability to provide communities with access to adequate and sufficient water.<sup>1944</sup> Consequently, this study now seeks to determine potential avenues outside the law to address the four city-level challenges presented in the preceding chapters.<sup>1945</sup> These avenues include innovation and technology, with a particular focus on intelligent water management technologies.<sup>1946</sup>

According to the Water Research Commission, innovation is regarded as one of the "critical success factors" essential to address the systemic water challenges and enable socio-economic transformation.<sup>1947</sup> Innovation<sup>1948</sup> necessitates concerted effort from all spheres of government, the private sector, and civil society at large.<sup>1949</sup> Despite the fact that South Africa has been a central developer of innovative water technologies for several decades,<sup>1950</sup> with many of these technologies being adopted worldwide, it

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<sup>1941</sup> See para 2.5.3 and chapter 3 above.

<sup>1942</sup> See chapter 3 and 4 above.

<sup>1943</sup> See chapter 4 above.

<sup>1944</sup> See para 2.5 and chapter 3 and 4 above.

<sup>1945</sup> See paras 1.5 and 1.6 above.

<sup>1946</sup> See para 5.2 and 5.4 below.

<sup>1947</sup> Water Research Commission *The South Africa Water Innovation Story* 10.

<sup>1948</sup> See paras 1.1 and 1.5 above.

<sup>1949</sup> Water Research Commission *The South Africa Water Innovation Story* 10.

<sup>1950</sup> Water Research Commission *The South Africa Water Innovation Story* 10.

continues to face complex water provision challenges such as those focused on in this study.<sup>1951</sup>

Moreover, while there seems to be a consensus amongst both researchers and policymakers that innovation is integral to enhance access to basic services, some questions remain about the readiness of municipalities to embrace innovation. For instance, exactly how ready are municipal officials and municipalities as organisations to foster innovation in the local government sphere?<sup>1952</sup> More precisely, are municipalities capable of determining and implementing innovative solutions to pertinent basic service delivery backlogs or breakdowns in distressed cities?<sup>1953</sup>

While the above is up for determination in this chapter, many cities in the country have researched, investigated, and adopted certain innovations in the form of technology to address specific water provision-related challenges.<sup>1954</sup> However, cities are unique and diverse ecosystems shaped by, for example, their specific economic, cultural, geographic, and cultural contexts.<sup>1955</sup> Thus, it is conceded that there rarely exists a one-size-fits-all solution for water service provision challenges in particular.<sup>1956</sup> The investigation of innovations and technologies aimed at solving city-level water provision challenges is necessary to determine whether these solutions are of actual relevance to cities. It is further necessary to prevent the ultimate implementation of inappropriate innovative solutions or technologies by cities.

The aforementioned is particularly relevant, since a prominent court case already illustrated the potential pitfalls of technological interventions concerning the constitutional water right. The *Mazibuko* case<sup>1957</sup> was centred on the CoJ's "Free Basic Water Policy"

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<sup>1951</sup> See chapters 1, 3 and 4 above.

<sup>1952</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity* 2.

<sup>1953</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity* 2.

<sup>1954</sup> WWF-SA *Water: Facts and Figures – Rethinking South Africa's Water Future* 46, 59, 64.

<sup>1955</sup> IMQS *Smart Water for Smart Cities* 8.

<sup>1956</sup> IMQS *Smart Water for Smart Cities* 8.

<sup>1957</sup> See paras 2.5.2.2 and 2.5.3 above.

and the installation of pre-paid water meters by the CoJ.<sup>1958</sup> The Constitutional Court determined that the pre-paid water system was not unfairly discriminatory, and that the allocation of six kilolitres of water per household was fair.<sup>1959</sup> Nevertheless, the use of these meters limited households to six kilolitres per household per month, regardless of the number of persons in the household. The argument is that this affected individuals in the community's constitutional right to sufficient water.<sup>1960</sup> Thus, the case highlighted the risks and possible unintended consequences of the use of technology to help advance fulfilment of the right to access to sufficient water.

According to this study's focus, intelligent water management technologies are presented as a possible avenue to address water provision challenges in cities.<sup>1961</sup> Specifically, the objective of this chapter is to determine whether relevant and appropriate intelligent water management technologies exist that could potentially be utilised by cities to address the challenges of non-revenue water, illegal water connections, insufficient data, and the sustainability of water services.<sup>1962</sup> The purpose of such an investigation is to present intelligent water management technologies as an avenue to address water service delivery challenges in cities that impede their function to provide water services to communities, in an effort to realise everyone's constitutional water right.

Considering that the primary subject of this chapter is technology and innovation, it inevitably entails discussions of a technical nature. Specifically, this section of the study delves into the finer details of specific technologies, innovations, and scientific disciplines. The latter is necessary to effectively illustrate the potential and relevance of intelligent water management technologies in addressing city-level water service delivery challenges.

To fulfil the objective of this chapter, in the following sections, the need emphasised in law and policy for the development and use of innovative and technological solutions,

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<sup>1958</sup> Pre-paid meters were part of the enforcement mechanisms of the city's Free Basic Water Policy, and ensured that every household was allocated six kilolitres of water per month; see the *Mazibuko* case paras 78 – 97.

<sup>1959</sup> *Mazibuko* case para 157.

<sup>1960</sup> See the *Mazibuko* case paras 78 – 97.

<sup>1961</sup> See paras 1.6 and 1.9 above.

<sup>1962</sup> See paras 1.6 and 1.7 above.

particularly in relation to water service delivery, will be discussed.<sup>1963</sup> The argument that innovation and technology are appropriate avenues to pursue the challenges focused on in this study is grounded in the law, which is the primary discipline of this study. Additionally, the chapter seeks to contextualise the country's current situation in this regard by sketching the status quo as to the uptake of water technologies and innovations.<sup>1964</sup>

The focus of the chapter then shifts to intelligent water management technologies.<sup>1965</sup> The purpose of the extensive investigation into intelligent water management technologies in this chapter is to foster a deeper understanding of what these technologies entail,<sup>1966</sup> how they have been implemented in three specific cities in South Africa<sup>1967</sup> and with what levels of success. Finally, the purpose also extends to determine whether/which novel intelligent water management technologies may be used to address the four main water challenges in this study.<sup>1968</sup>

The chapter extrapolates from currently available documents, strategies, case studies, and other available information to determine whether the CoJ, the eMM, and the NMBMM have considered innovation and technology, specifically intelligent water management technologies, as a measure to address their water service delivery problems.<sup>1969</sup> The purpose of such an analysis is to determine, in a very scoped manner, the willingness of some of the major metropolitan municipalities to embrace intelligent water management technologies. In addition, the latter analysis serves as an assessment of what has been done by these cities and what remains to be done in terms of intelligent water management technologies. Following this approach allows this study to make potentially novel recommendations for the use of intelligent water management technologies by cities to address the issues of non-revenue water, illegal water connections, insufficient data, as well as the sustainability of water services.<sup>1970</sup> Subsequently, this chapter

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<sup>1963</sup> See para 5.2 below.

<sup>1964</sup> See para 5.3 below.

<sup>1965</sup> See para 5.4 below.

<sup>1966</sup> See para 5.4.1 below.

<sup>1967</sup> See para 5.4.3 below.

<sup>1968</sup> See chapters 1, 3 and 6.

<sup>1969</sup> See para 5.4.2.1 – 5.4.2.3 below.

<sup>1970</sup> See chapter 6 below.

investigates any potential challenges or stumbling blocks that cities may experience during the uptake of intelligent water management technologies.<sup>1971</sup> The latter is important, especially towards enabling this study to make realistic suggestions concerning intelligent water management technologies as an avenue to realise the constitutional water right.

## **5.2 The policy vision for innovative approaches to water service delivery challenges**

Previous chapters of this study have emphasised the need to provide communities with access to sufficient water and that the function of providing water services falls on cities that are troubled by many challenges in this regard.<sup>1972</sup> Attention was paid to some specific city-level challenges,<sup>1973</sup> as well as whether the law sufficiently regulates these challenges.<sup>1974</sup> The question of whether cities should or could do more to address these challenges, especially by way of innovation, has yet to be dealt with. As such, this section seeks to determine the need for innovative approaches in policy as an avenue to address water service delivery challenges in South African cities to ensure the realisation of the constitutional water right.

Although many definitions of the term "innovation" exist, this study adopts the definition upheld in the 1996 *White Paper on Science and Technology* (hereafter, the *White Paper*).<sup>1975</sup> Thus, innovation is understood as the application and practice of creative new ideas, including introducing interventions into the marketplace.<sup>1976</sup> The 2019 *White Paper on Science, Technology and Innovation*<sup>1977</sup> states that *an innovation* means implementing a new or significantly improved product (good or service) or process, or a novel marketing

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<sup>1971</sup> See para 5.6 below.

<sup>1972</sup> See chapter 2 and 3 above.

<sup>1973</sup> See chapter 3 above.

<sup>1974</sup> See chapter 4 above.

<sup>1975</sup> The *White Paper on Science and Technology* 1996 in GN 1687 in GG 17675 of 20 December 1996.

<sup>1976</sup> Chapter 3 s 1 of the *White Paper*.

<sup>1977</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018.



method, new organisational model in business practice, workplace organisation, or external relations.<sup>1978</sup>

South Africa's *NDP* states that finding innovative approaches to address the country's biggest problems is necessary for a middle-income country to develop.<sup>1979</sup> This includes focusing on scientific and technological advances. Likewise, the *NDP* echoes suggestions in the *White Paper* of more than two decades ago regarding science and technology. The *White Paper* states that both research and technology are important ingredients for innovation in an ever more competitive international economy.<sup>1980</sup> Furthermore, the *White Paper* suggests that inter-municipal cooperation should include, for instance, the exchange of learning experiences and technology.<sup>1981</sup> Knowledge sharing<sup>1982</sup> of this kind may be regarded as integral for cities to successfully harness innovative technologies and ultimately reach their service delivery mandates.<sup>1983</sup>

However, in the years after adopting the *White Paper*, a greater emphasis on *innovation*, amongst other things, culminated in the adoption of the 2019 *White Paper on Science, Technology and Innovation*.<sup>1984</sup> The latter instrument, while recognising the work that has been done in the sector in the past, introduced many policy shifts, for instance, enhancing the innovation culture in society and government, improving policy coherence and the coordination of budgets across government, developing a more enabling environment for innovation as well as developing local innovation systems.<sup>1985</sup> The paradigm shift that the new *White Paper on Science, Technology and Innovation* presents is vital towards enabling the research, development, testing, and implementation of especially

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<sup>1978</sup> *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 vii.

<sup>1979</sup> *NDP* 33; see also paras 1.4 and 4.3.1.14 above.

<sup>1980</sup> S 2.3.2 of the *White Paper*.

<sup>1981</sup> S 3.2 of the *White Paper*.

<sup>1982</sup> Ordóñez de Pablos and Lytras 2018 *Sustainability* 2 -7.

<sup>1983</sup> Mothamaha and Govender 2014 *IJMSR* 1 – 8.

<sup>1984</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018.

<sup>1985</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 iii.

technological innovations that could address the country's socio-economic problems,<sup>1986</sup> such as issues of access to water.

The new *White Paper on Science, Technology and Innovation* makes the argument that planning between the different spheres of government and the private sector is vital to ensure that the country partakes in the broad development of world-leading technologies, systems, and capabilities that are tailored for South Africa, instead of merely adopting such solutions or technologies.<sup>1987</sup> Collaborative planning and coordination of this kind may require developing a policy nexus that includes stakeholders such as the Department of Science and Technology, as well as the Department of Telecommunications and Postal Services.<sup>1988</sup> The latter may, for instance, assist in modernising government services, using open data to transform local government service provision, using Big Data at the local level to create jobs, utilising e-governance services to transform service delivery in local government, as well as prioritise issues such as cybersecurity resilience and driving the digital society in the country.<sup>1989</sup>

The above is emphasised in the RDI Roadmap, which envisions establishing South Africa as a leader among middle-income countries regarding the development and deployment of, specifically, water management practices.<sup>1990</sup> To achieve this, the National Water Research, Development, and Deployment Programme was developed to, for instance, deliver a minimum of one breakthrough water technology every five years.<sup>1991</sup> In doing so, it was hoped that the Programme will assist cities in increasing the availability of water, improve the planning, management, and governance of water provision and

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<sup>1986</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 iii.

<sup>1987</sup> Examples include AI, Big Data, embedded systems, software layers and a large number of sensors, as well as fast connectivity and advanced signal processing, amongst other innovations; see the *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 40.

<sup>1988</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 40.

<sup>1989</sup> The *White Paper on Science, Technology and Innovation* 2019 GN 954 in GG 41909 of 14 September 2018 40.

<sup>1990</sup> RDI Roadmap i. The Roadmap does, however, acknowledge that its root contribution lies in the sector success associated with improved co-ordination, better decision-making, and greater enablement, mainly via the systemic translation of research into "operational practice"; see the RDI Roadmap 59; para 4.3.15 above.

<sup>1991</sup> RDI Roadmap I, 58.

delivery, improve the efficiency and productivity of water use, as well as enable water and sanitation services to function as a sustainable business.<sup>1992</sup>

The RDI Roadmap provides that the principal purpose of the technology in the Roadmap is the deployment thereof to solve national needs.<sup>1993</sup> The RDI Roadmap, along with its National Water Research, Development, and Deployment Programme, shows the importance and need for developing innovative technologies to address various water provision-related challenges in the country, particularly to ensure the realisation of the constitutional water right. Alongside its commitment to technology and innovation in the water sector, the Roadmap states that it aims to improve basic services with an emphasis on delivering water and sanitation services.<sup>1994</sup>

Notably, the RDI Roadmap also provides vital considerations and guidance concerning the uptake of *innovations*.<sup>1995</sup> The Roadmap holds that the research, development, and deployment process entails various stages: exploring, testing, demonstration, and deployment.<sup>1996</sup> Additionally, it states that innovations may present specific types of potential during research, development, and deployment, e.g., management potential, information potential, technological potential, or capacity potential.<sup>1997</sup>

The RDI Roadmap thus confirms technological innovations as a potential avenue to address water provision challenges. While the RDI Roadmap provides for more kinds of

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<sup>1992</sup> RDI Roadmap i.

<sup>1993</sup> RDI Roadmap 59.

<sup>1994</sup> RDI Roadmap i.

<sup>1995</sup> RDI Roadmap 73.

<sup>1996</sup> Exploration is regarded as the earliest stage in the innovation chain, and portrays the quantification of a possibility. Testing involves both proof of concept and feasibility studies, and is seen as fundamental for early applied research. On the other hand, demonstration is a later stage during which a prototype is either piloted, demonstrated or trialed in a context that is approximate to the conditions or situation under which the technology is intended to be used. Finally, deployment is the roll-out stage, and involves the introduction or implementation of the new technology or technique in order for it to be mainstreamed and accepted, instead of being perceived as being novel. See the RDI Roadmap 73.

<sup>1997</sup> Management potential implies the potential to satisfy a specific need via improved management of an existing technology and/or know-how. Information potential means to satisfy a certain need through offering higher quality or more generally available information concerning existing technology and/or know-how. Technology potential is understood as satisfying a particular need via the creation of a new technological process or item. Lastly, capacity potential is satisfying a need through increasing the number of persons in the water community who possess certain skills necessary to both implement and operate appropriate know-how or technologies. See the RDI Roadmap 73.

innovations, this study focuses on technological innovation as an avenue to address the four specific challenges previously identified. The purpose of this specific investigation is to determine whether intelligent water management technologies, in particular, as technological innovation, could serve as an avenue to realise the constitutional water right by aiding cities in tackling the relevant water service delivery-related challenges.<sup>1998</sup>

Another legal instrument integral to the water discourse, namely the *NWRS*,<sup>1999</sup> promotes the use of innovative technologies and provides considerations that must be kept in mind when the use of such technologies is contemplated. The *NWRS* strongly encourages the use of technology and innovation to bring about efficient and effective water management solutions that aim to address the need for water security and sustainability and the productive and strategic use of water.<sup>2000</sup> Nevertheless, the *NWRS* also expresses important concerns about ensuring the cost-effectiveness of large investments in innovations in the water sector and the appropriateness of the technology employed in certain circumstances.<sup>2001</sup>

The *NWRS* states that all water infrastructure must be value-engineered against the life-cycle cost thereof.<sup>2002</sup> Evidence must be proffered to substantiate that the technical design of such infrastructure is appropriate and that the maintenance and operation thereof are reasonable and within the institution's capability.<sup>2003</sup> From this, one may gather that technologies aimed at solving water challenges should be context-specific and appropriate, provide sustainable solutions, and be affordable.

According to the *National e-Strategy*,<sup>2004</sup> resolving the challenge of managing utilities, such as water, is a critical issue that must be addressed as a part of the planning process focused on introducing a primarily ICT enabled plan for the government to accelerate change.<sup>2005</sup> The Strategy links ICTs with the key deliverables of the different spheres of

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<sup>1998</sup> See paras 1.1, 1.3, 1.6, 3.3 and 5.4.

<sup>1999</sup> See para 4.3.13 above.

<sup>2000</sup> The *NWRS* iv.

<sup>2001</sup> The *NWRS* 27.

<sup>2002</sup> The *NWRS* 27.

<sup>2003</sup> The *NWRS* 27.

<sup>2004</sup> See para 1.5 above.

<sup>2005</sup> GN 887 in GG 41242 of 10 November 2017 14 – 15.

government, as expressed in various plans and policies.<sup>2006</sup> For instance, to resolve the problem of managing water, the *National e-Strategy* proposes that smart solutions should be introduced to support the efficient management of utility infrastructure, as well as modernising the utility services provided through such infrastructure.<sup>2007</sup> The aforementioned is aimed at creating smarter communities.<sup>2008</sup>

The Strategy also suggests state reform and improving the role of state-owned companies, ICT infrastructure, and water and sanitation infrastructure.<sup>2009</sup> To achieve this, the support and uptake of ICTs by state-owned enterprises to optimise service delivery to communities is encouraged.<sup>2010</sup> The latter entails introducing and integrating ICT enabled smart water and sanitation technologies as part of the government's industry and service delivery innovation plans.<sup>2011</sup>

Furthermore, the *National e-Strategy* encourages South Africa to embrace the opportunities presented by the Fourth Industrial Revolution.<sup>2012</sup> Additionally, the country's approach to the Revolution should be underpinned by, for instance, technologies that can be transferred to local industries to improve the efficiency of service delivery.<sup>2013</sup> On this note, the Presidential Commission on the Fourth Industrial Revolution recently published a detailed report outlining the country's overarching strategy for the Revolution and included recommendations as to the institutional frameworks and the roles of various sectors of the public.<sup>2014</sup> The report states that the Commission recognises the potential to use technology to address some of the most challenging problems faced by South Africa.

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<sup>2006</sup> GN 887 in GG 41242 of 10 November 2017 14.

<sup>2007</sup> GN 887 in GG 41242 of 10 November 2017 15.

<sup>2008</sup> GN 887 in GG 41242 of 10 November 2017 15.

<sup>2009</sup> GN 887 in GG 41242 of 10 November 2017 16.

<sup>2010</sup> GN 887 in GG 41242 of 10 November 2017 16.

<sup>2011</sup> GN 887 in GG 41242 of 10 November 2017 16.

<sup>2012</sup> Schwab opines that the Fourth Industrial Revolution is characterised "by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human"; see the World Economic Forum 2016 <https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab/>.

<sup>2013</sup> GN 887 in GG 41242 of 10 November 2017 17.

<sup>2014</sup> See GN 591 in GG 43834 of 23 October 2020.

The report also provides that in analysing global best practice, a framework was developed comprising of eight pillars, one of which focuses on service delivery and ensuring that South Africa is regarded as an international leader in this targeted area. The report recognises that the regression in the water and energy sector is the single most significant threat in terms of economic growth and human development.<sup>2015</sup> Given this, as part of its extended recommendations, the Commission posits that the technologies of the Fourth Industrial Revolution should be harnessed to strengthen the capacity of local government to provide service delivery to communities.<sup>2016</sup> Accordingly, the Commission suggests building internal government capabilities across a variety of technological domains, including the use of data analytics and AI in governance as well as the use of other technologies resultant from the Fourth Industrial Revolution to deliver various services.<sup>2017</sup>

The Presidential Commission on the Fourth Industrial Revolution also conducted an initial analysis of how technologies from the Fourth Industrial Revolution can be utilised to address or alleviate certain vital challenges. In this regard, suggestions were also made towards water and sanitation.<sup>2018</sup> Since water and sanitation are local government functions, these suggestions may be regarded as explicitly aimed at local governments. The Commission found that advancements in smart water meters could provide real-time and detailed water use to enhance responsible industrial and domestic water use.<sup>2019</sup> In later suggestions on the country's infrastructure, the report provides that infrastructure is the cornerstone of a modern society that consists of grid-like networks, e.g., water and digital networks.<sup>2020</sup> Future infrastructure is deemed as being data-enabled, software-based with cloud access.<sup>2021</sup> Such infrastructure is envisioned to improve access to information while promoting transparency of local government processes and constructing interconnected and empowered communities.<sup>2022</sup>

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<sup>2015</sup> GN 591 in GG 43834 of 23 October 2020 13.

<sup>2016</sup> GN 591 in GG 43834 of 23 October 2020 123.

<sup>2017</sup> GN 591 in GG 43834 of 23 October 2020 123.

<sup>2018</sup> GN 591 in GG 43834 of 23 October 2020 153.

<sup>2019</sup> GN 591 in GG 43834 of 23 October 2020 153.

<sup>2020</sup> GN 591 in GG 43834 of 23 October 2020 163.

<sup>2021</sup> GN 591 in GG 43834 of 23 October 2020 163.

<sup>2022</sup> GN 591 in GG 43834 of 23 October 2020 163.

While a clear need is expressed in law and policy for the uptake of innovations and technologies, it warrants determining the status quo of South Africa as to the *actual* uptake of such opportunities, specifically concerning water innovations and technologies. This issue will be investigated below to determine if there is any real interest in the country towards utilising water technologies to solve complex water-related challenges. Once this has been established, intelligent water management technologies are considered as a potential avenue to assist local governments in their water provision function, especially towards the realisation of the constitutional water right.

### **5.3 The uptake of water technologies and innovations in South Africa**

Several issues persist in terms of the status quo of the uptake of water technologies and innovation in South Africa. As per a technical report drafted by Sinyolo, Jacobs, and Hart, a primary consideration regarding the up-take of innovation in the public sector in South Africa is the capabilities (or lack thereof) of the officials and maturity of organisations to identify, learn and implement innovations.<sup>2023</sup> Additionally, they must share knowledge concerning innovations with the necessary stakeholders to promote the diffusion of innovation at all government levels.<sup>2024</sup>

The Municipal Innovation Maturity Index (hereafter the MMI) is a tool developed to assess municipalities' capability to support service delivery innovation.<sup>2025</sup> As per the MMI results, a marginal increase was revealed in the general innovation maturity of municipalities.<sup>2026</sup> Although municipalities were aware of and understood innovations relating to basic service delivery, they have yet to reach a stage where innovation principles are embedded in their institutions.<sup>2027</sup> Therefore, one may determine that while there may be water

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<sup>2023</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity 2.*

<sup>2024</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity 2.*

<sup>2025</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity 1.*

<sup>2026</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity 1.*

<sup>2027</sup> Sinyolo, Jacobs and Hart *Innovation for basic service delivery: enhancing municipal innovation maturity 1.*

innovations available, challenges persist in the water sector,<sup>2028</sup> most likely due to the lack of innovative solutions being incorporated by municipalities, as indicated by the MMI.

Water research and development are susceptible to issues such as a poor understanding of water sector organisations' role in driving forward innovation and practically implementing solutions, weak coordination, and synergising of research activities between institutions.<sup>2029</sup> Further issues include limited funding for innovation during its development and scale-up phase, and challenges relating to scaling up solutions to be market-ready.<sup>2030</sup> The *Master Plan*<sup>2031</sup> suggests that, in this regard, for the country to be able to embrace the future challenges in the water sector, the "innovation chasm" must be addressed; namely, instances where emerging innovations are not tested at scale or developed into viable businesses that are capable of engaging with various private and public sector role players.<sup>2032</sup>

Fortunately, various public and private institutions are currently engaging with water technology and innovation challenges. According to the *Master Plan*, while the Water Research Commission remains the leader in engaging with potential innovative solutions for water challenges, various government departments are also involved with either funding of or supporting innovation and research activities in different ways.<sup>2033</sup> Science councils, non-profit organisations, tertiary academic institutions, as well as private sector stakeholders, are also involved in supporting and developing water research and innovation.<sup>2034</sup> Therefore, a rich institutional and skills environment exists in this regard, and innovations pertaining to the water sector are expected to continuously develop.<sup>2035</sup>

One promising step forward in terms of the uptake of water technology innovations in the country is the recent partnership between the Water Research Commission and the South African Local Government Association that resulted in the launch of the "Water

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<sup>2028</sup> See chapters 1, 3 and 4 above.

<sup>2029</sup> Volume 1 of the *Master Plan* 55.

<sup>2030</sup> Volume 1 of the *Master Plan* 55.

<sup>2031</sup> See para 4.3.16 above.

<sup>2032</sup> Volume 1 of the *Master Plan* 55.

<sup>2033</sup> Volume 1 of the *Master Plan* 55.

<sup>2034</sup> Volume 1 of the *Master Plan* 55.

<sup>2035</sup> Volume 1 of the *Master Plan* 55.



Technology Innovation Forum".<sup>2036</sup> This Forum is one of seven platforms falling under the Local Government Integrated Water and Sanitation Technology and Innovation Umbrella.<sup>2037</sup> The Water Technology Innovation Forum aims to act as a platform that explores the opportunities and challenges for improving the technology landscape at local government level.<sup>2038</sup>

A vital function of the Forum will be serving as a platform for collaboration for municipal partners to communicate their innovation needs, establish partnerships, and jointly create projects, programmes, and funding.<sup>2039</sup> This also includes facilitating peer-to-peer learning and the exchange of knowledge pertaining to innovative solutions. The Chief Executive of the Water Research Commission highlights that the Forum seeks to enable, for instance, establishing and expanding on a network of testbeds for any ground-breaking solutions as to water provision that emanates from the country as well as from international research and development partnerships.<sup>2040</sup> The Water Technology and Innovation Forum will, furthermore, seek to safeguard the interests of both municipalities and the water sector by establishing an enabling environment that allows municipalities to request guidance before employing water technology solutions.<sup>2041</sup> Finally, the Forum will also provide municipalities with options regarding vetted and proven technologies by experts from the water sector.<sup>2042</sup>

The next section of this chapter elaborates on intelligent water management technologies in particular as a solution to certain water challenges faced by cities. The latter will facilitate a better understanding of what these technologies entail, how they have been utilised internationally, and whether local cities have employed them. This analysis is

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<sup>2036</sup> The South African Government 2020 <https://www.gov.za/speeches/salga-launches-water-technology-and-innovation-forum-29-sep-2020-0000>.

<sup>2037</sup> The South African Government 2020 <https://www.gov.za/speeches/salga-launches-water-technology-and-innovation-forum-29-sep-2020-0000>.

<sup>2038</sup> The South African Government 2020 <https://www.gov.za/speeches/salga-launches-water-technology-and-innovation-forum-29-sep-2020-0000>.

<sup>2039</sup> SALGA 2020 <http://www.salga.org.za/Salga%20News419.html>.

<sup>2040</sup> SALGA 2020 <http://www.salga.org.za/Salga%20News419.html>.

<sup>2041</sup> SALGA 2020 <http://www.salga.org.za/Salga%20News419.html>.

<sup>2042</sup> SALGA 2020 <http://www.salga.org.za/Salga%20News419.html>.

done to be able to make specific recommendations for potential and appropriate technologies to address this study's four focal water challenges.<sup>2043</sup>

## **5.4 Intelligent water management technologies**

As a starting point, it is necessary to clarify that the term "intelligent" to describe innovative water management technologies or solutions is not widely-used, most likely because the term "smart" is catchier.<sup>2044</sup> However, in this study, the term "intelligent" is used deliberately since it is argued that it appropriately encapsulates the broad scope of technologies and scientific disciplines involved in water management technologies, in addition to avoiding confusion between smart water systems and intelligent water management technologies.<sup>2045</sup> Within this study's scope and resultant from a broad literature review, intelligent water management technology is viewed as a multidisciplinary term and is understood to include aspects of smart water systems/infrastructure, the IoT, ICTs, data science, and Big Data.<sup>2046</sup> The following section introduces intelligent water management technologies. It provides examples of how it has been utilised internationally, and whether it has been used by cities locally, to ultimately present possible applications of these technologies to address non-revenue water, illegal water connections, and insufficient data as well as the sustainability of water services. Finally, the section will reflect on challenges and stumbling blocks that cities may encounter in adopting these technologies.

### ***5.4.1 Intelligent water management technologies: an introduction***

Intelligent water management technologies or an intelligent water management network utilises smart infrastructure (such as sensors, smart valves, smart pipes, and smart pumps), in addition to ICT and IoT integration.<sup>2047</sup> This allows for automation, data communication, Big Data development, data management, data fusion, analysis, and

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<sup>2043</sup> See para 5.6 below.

<sup>2044</sup> Owen *Smart Water Technologies and Techniques: Data Capture and Analysis for Sustainable Water Management* 1.

<sup>2045</sup> See para 1.6 above.

<sup>2046</sup> See para 1.6 above.

<sup>2047</sup> The Smart Water Networks Forum 2019 <https://www.swan-forum.com/swan-tools/what-is-a-swn/>.

prediction tools.<sup>2048</sup> Thus, intelligent water management technologies cover many categories of technological innovation in the water system, such as real-time monitoring and automation, decision support, network planning, operational readiness, and advanced analytics.<sup>2049</sup>

The main approach to understanding intelligent water management technologies or networks is to view it as consisting of layers.<sup>2050</sup> This is similar to any other data ecosystem, starting from sensors, remote control, as well as enterprise data sources, through data collection and communication, data display and management, up to and including data analysis and fusion.<sup>2051</sup> Arguably, it is the architecture involved in intelligent water management technologies that are layered. At the minimum, the latter comprises five layers, namely a physical layer, control and sensing layer, a collection and communications layer, a data management and display layer, and a data fusion and analysis layer.<sup>2052</sup>

As the name suggests, the "physical layer"<sup>2053</sup> comprises the physical elements that allow for the distribution and provision of water throughout the network, such as the pumps, valves, pipes, and delivery endpoints.<sup>2054</sup> Although the physical layer does not have a data interface, the layer may be controlled by the sensing and control layer,<sup>2055</sup> which entails sensors, measuring equipment, and/or devices capable of being controlled remotely.<sup>2056</sup>

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<sup>2048</sup> Li, Yang and Sitzenfrei 2020 *Water* 4.

<sup>2049</sup> The Smart Water Networks Forum 2019 <https://www.swan-forum.com/swan-tools/what-is-a-swn/>.

<sup>2050</sup> This approach is derived from the original International Standards Organisation's (hereafter, the ISO) "Reference Model of Open Systems Interconnection". The primary aim of the latter model is to provide a "common basis for the coordination of standards development for the purpose of systems interconnection, while allowing existing standards to be placed into perspective within the overall Reference Model." The general practical application of this ISO Reference Model is internetworking, for example, client-server communication on the internet. See the ISO 1994 <https://www.iso.org/obp/ui/#iso:std:iso-iec:7498:-1:ed-1:v2:en>. Li, Yang and Sitzenfrei 2020 *Water* 5; The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Luciani *et al* 2018 *Proceedings* 1 – 6; Luciani *et al* 2019 *Water* 1 – 14; Owen "The Technologies and Techniques Driving Smart Water" 57 – 76.

<sup>2051</sup> The Smart Water Networks Forum 2019 <https://www.swan-forum.com/swan-tools/what-is-a-swn/>.

<sup>2052</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Li, Yang and Sitzenfrei 2020 *Water* 9 – 18.

<sup>2053</sup> This may also be called the "instruments layer"; see Li, Yang and Sitzenfrei 2020 *Water* 10.

<sup>2054</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>.

<sup>2055</sup> This layer may also be described as the "property layer"; see Li, Yang and Sitzenfrei 2020 *Water* 11 – 13.

<sup>2056</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Srihari 2018 *IEEE* 785 – 789.

The collection and communications layer,<sup>2057</sup> on the other hand, is responsible for the discrete collection, storage, and transmission of data from the sensing and control layer and utilises two-way communication mechanisms, such as fixed cable networks or Wi-Fi to instruct sensors as to what data must be collected, or which actions must be executed.<sup>2058</sup>

From this point onwards, all layers either include human operators or central systems/software. For instance, the data management and display layer<sup>2059</sup> brings the different data sources together and may be used by human operators, or instructions from human operators or central systems may be translated into concrete device settings.<sup>2060</sup> While the latter layer also comprises of GIS<sup>2061</sup> or schematic visualisation tools, data repositories, and control room systems rigged with simple alert rules, the data fusion and analysis layer<sup>2062</sup> primarily brings together all raw input data and derives information that may not have been obvious without processing the data.<sup>2063</sup> The final level allows one to obtain high-value information such as network forecasts and high-level summaries, and includes smart pressure management, pumping optimisation systems, and decision support systems.<sup>2064</sup>

The "layered architecture" allows one to isolate certain technologies or scientific disciplines from intelligent water management technologies. Arguably, this enables an in-depth analysis of each technology, contributing to the deeper and holistic understanding of intelligent water management technologies. Such an understanding is viewed as necessary to establish novel and potentially cost-effective solutions or recommendations concerning the use of these technologies in cities, especially in terms of the

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<sup>2057</sup> This layer may also be called the "function layer"; see Li, Yang and Sitzenfrei 2020 *Water* 13.

<sup>2058</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Srihari 2018 *IEEE* 785 – 789.

<sup>2059</sup> This layer can be described as the "benefit layer"; see Li, Yang and Sitzenfrei 2020 *Water* 13 – 15.

<sup>2060</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>.

<sup>2061</sup> For the use of GIS in the water sector, see Urbanczyk "GIS, GPS, and Satellite Data" 79 – 102.

<sup>2062</sup> This final layer is also known as the "application layer"; see Li, Yang and Sitzenfrei 2020 *Water* 15 – 16.

<sup>2063</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Gonçalves, Soares, Lima 2020 *Future Internet* 1 – 17.

<sup>2064</sup> The Smart Water Networks Forum 2018 <https://www.swan-forum.com/swan-tools/a-layered-view/>; Gonçalves, Soares, Lima 2020 *Future Internet* 1 – 17.

appropriateness thereof for the challenges of non-revenue water, illegal water connections, insufficient data, and the sustainability of water service provision.

From the layered perspective discussed above, and with due consideration of the literature on the topic, one can identify smart water infrastructure, ICTs, the IoT, data science, and Big Data as technologies and scientific disciplines forming a part of intelligent water management technologies.<sup>2065</sup> The study views *smart water infrastructure* as part of the physical, sensing and control, and collection and communications layers. *ICTs* are viewed as a part of the sensing and control, in addition to the collection and communications layers. The *IoT* is considered to be a part of the sensing and control, in addition to the collections and communications layers. Data science and Big Data are understood as forming part of the collections and communications layer, the data management and display layer, and the data fusion and analysis layer.

Since it forms the basis of many of the technologies involved in intelligent water management technologies, it is appropriate to commence by conceptualising ICTs. The novel application and use of ICTs over the years is nearly unfathomable, as is the effect it has on human life,<sup>2066</sup> and it is perhaps no surprise that the conceptualisation of ICTs in the literature vary tremendously.<sup>2067</sup> However, for this study, it may be sufficient to describe ICTs as an umbrella term that refers to all technology employed to handle telecommunications, broadcast different forms of media, audio-visual processing, and transmission structures, as well as monitoring and network-based control functions.<sup>2068</sup> It may entail utilising devices such as computers to transmit, store, manipulate or retrieve information or data.<sup>2069</sup>

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<sup>2065</sup> See para 1.6 above.

<sup>2066</sup> Roztocki and Weistroffer 2016 *Information Technology for Development* 541 – 549.

<sup>2067</sup> Most primary definitions stem from the "IT" in "ICT"; see Zhang, Scialdone, and Ku "IT Artifacts and the State of IS Research" 1 – 14; see also Sein and Harindranath 2004 *The Information Society* 15 – 24; Sawyer and Chen "Conceptualizing Information Technology in the Study of Information Systems: Trends and Issues" 110 – 129.

<sup>2068</sup> Dutton "Computers and Society" 2480 – 2487; Asociación EuropeYou 2019 <http://europeyou.eu/es/what-is-information-and-communication-technology/>; Idaho Assistive Technology Project 2020 <https://idahoa.org/services/resources/ICT>.

<sup>2069</sup> Asociación EuropeYou 2019 <http://europeyou.eu/es/what-is-information-and-communication-technology/>.

Although ICT components are ever-increasing, it involves software, cloud computing, wireless networks, computers, hardware, middleware, digital data, digital transactions, internet access, and many others.<sup>2070</sup> Due to its broad scope of application, it is no surprise Hamdy<sup>2071</sup> posits that ICTs are becoming increasingly a vital enabling tool for the acquisition of data, early evaluation, automated management and communication in the water sector. Therefore, ICTs are extensively employed in water management by stakeholders in the water sector globally, in pursuit of intelligent water management to satisfy a variety of challenges and demands.<sup>2072</sup>

Next, the IoT<sup>2073</sup> is described as the network of things or physical objects embedded with software, sensors, electronics, connectivity, and actuators to enable objects to transmit and exchange data with other connected devices, the operator, or manufacturer of the device.<sup>2074</sup> While the use of the IoT became popular more recently, the notion was already used in 1999 by Ashton in the context of supply chain management.<sup>2075</sup> Gershenfeld<sup>2076</sup> also utilised the term in 1999. The author saw the evolution of the World Wide Web as a state in which "things" commence utilising the "Net" (a term that is considered to accurately capture the broad scope of communication involved in the IoT) so that humans do not have to.<sup>2077</sup>

The IoT refers to devices that normally have constrained communication capabilities that are now becoming connected to the internet or an Internet Protocol<sup>2078</sup> (hereafter, IP)

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<sup>2070</sup> Dutton "Computers and Society" 2480 – 2487; Asociación EuropeYou 2019 <http://europeyou.eu/es/what-is-information-and-communication-technology/>; AIMS 2020 <http://aims.fao.org/information-and-communication-technologies-ict>; Idaho Assistive Technology Project 2020 <https://idahoaat.org/services/resources/ICT>.

<sup>2071</sup> Hamdy "Information and Communication Technologies in Smart Water Management" 1530.

<sup>2072</sup> Hamdy "Information and Communication Technologies in Smart Water Management" 1531.

<sup>2073</sup> For a comprehensive discussion of the IoT see generally Hassan *Internet of Things A to Z: Technologies and Applications*. See also Talari *et al* 2017 *Energies* 1 – 23.

<sup>2074</sup> Internet Engineering Task Force 2020 <https://ietf.org/topics/iot/>.

<sup>2075</sup> Schoder "Introduction to the Internet of Things" 3.

<sup>2076</sup> See generally Gershenfeld *When Things Start to Think*.

<sup>2077</sup> Schoder "Introduction to the Internet of Things" 3 – 8; See generally Gershenfeld *When Things Start to Think*.

<sup>2078</sup> An Internet Protocol address may be defined as the numbers assigned to computer network interfaces, and allows computers or devices to send data to the correct location. An IP address is, fundamentally, the numerical address that enables communication between network nodes, e.g., servers, computers, sensors, or mobile phones. For example, when one participates in a video conference, the device utilised to do so sends data packets to the IP address of the other end of the connection, and, in turn,

network and different services that are integrated into the capabilities that such devices jointly afford.<sup>2079</sup> For the most part, the IoT involves machine-to-machine interaction with the internet, with no human actively involved.<sup>2080</sup> The use of IoT is currently viewed as being at the centre of overlapping functionalities; for instance, it is internet-oriented (middleware), semantic-oriented (knowledge), as well as things-oriented (sensors).<sup>2081</sup> The rapid development of devices and sensors connected to the IoT has become a potential treasure trove for Big Data analytics, amongst other uses.<sup>2082</sup> Finally, because IoT devices utilise IPv6 addressing,<sup>2083</sup> users are ensured of a huge IP address space (which renders the IoT future-proof), allowing it to operate via active monitoring by computers enabled with network connectivity and controlled by sensors attached to such devices.<sup>2084</sup>

On the other hand, smart water systems/infrastructure, as a part of intelligent water management technologies, may entail using ICTs and the IoT to offer real-time, automated data that can be used to resolve water challenges.<sup>2085</sup> A range of new smart water systems has been developed with urban water service delivery in mind. For instance, *Smart Ultrapure Water* utilises a series of sensors in the water infrastructure to ensure high water quality while monitoring the system's conditions.<sup>2086</sup> Technologies such as smart water distribution management systems monitor the water in utility grids to

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receives packets sent to its own IP address. See the Internet Corporation for Assigned Names and Numbers *Beginner's Guide to Internet Protocol (IP) Addresses* 4.

<sup>2079</sup> Tripathy and Anuradha *Internet of Things (IoT): Technologies, Applications, Challenges and Solutions* 42; Internet Engineering Task Force 2020 <https://ietf.org/topics/iot/>.

<sup>2080</sup> Internet Engineering Task Force 2020 <https://ietf.org/topics/iot/>.

<sup>2081</sup> Schoder "Introduction to the Internet of Things" 5.

<sup>2082</sup> Internet Engineering Task Force 2020 <https://ietf.org/topics/iot/>.

<sup>2083</sup> IPv6 simply means "Internet Protocol version 6" and is the most recent version of the IP, which allows service providers or operators to add additional devices or users to their networks. IPv6 addresses are 128-bit identifiers (compared to the 32-bit identifiers of IPv4) for interfaces as well as sets of interfaces. See OECD *Internet Addressing: Measuring Deployment of IPv6* 4; Internet Engineering Task Force 2010 <https://tools.ietf.org/id/draft-ietf-behave-address-format-10.html#addressFormat>.

<sup>2084</sup> Panda and Tripathy "Internet of Things and Artificial Intelligence: A New Road to the Future Digital World" 42.

<sup>2085</sup> K Water *Smart Water Management: Case Study Reports* 10. Smart water systems include, for instance, smart grids and smart meters, and is understood as: "the suite of technologies designed to minimise and mitigate the impact of human activities on the natural environment and the potential for information technology, data transmission and perhaps, in the future, for using the Internet of Things to further optimise the effectiveness of such approaches; see Owen *Smart Water Technologies and Techniques: Data Capture and Analysis for Sustainable Water Management* 4.

<sup>2086</sup> ITU *Smart Water Management in cities* 13.

optimise both asset management and water distribution.<sup>2087</sup> Smart pipes and sensor networks, GIS, and supervisory control and data acquisition systems are all examples of innovative technologies that could contribute to water service delivery by managing, for instance, water losses in municipalities.<sup>2088</sup>

The data revolution<sup>2089</sup> we have been experiencing has led to the emergence of two components of intelligent water management technologies, namely data science, and big data.<sup>2090</sup> Data science<sup>2091</sup> may be conceptualised as a trans-disciplinary field that synthesises and builds on various relevant sources of knowledge and disciplines, including computing, informatics, statistics, sociology, management, and communication.<sup>2092</sup> The Data Science Association<sup>2093</sup> states that data science entails the scientific study of the creation, validation, and transformation of data to create meaning. Moreover, it is held that data science is that which focuses on the systems and processes which enable the extraction of insights, knowledge, and trends from data in its various forms, whether it is structured or unstructured.<sup>2094</sup>

Data science may be regarded as the story of the connection of the mature discipline of statistics with a noticeably young discipline, namely, computer science, and that data science has emerged as a profession designated to deal specifically with the vastness of

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<sup>2087</sup> ITU *Smart Water Management in cities* 13.

<sup>2088</sup> ITU *Smart Water Management in cities* 13 -17.

<sup>2089</sup> It is frequently held that we are living in the information age, and that in the 21<sup>st</sup> century, we have become highly reliant on data. Hence, data has become a buzzword, and the current scale of data generation is almost incomprehensible. Until 2003, all of humankind barely produced five exabytes of data. One exabyte of data is equal to one billion gigabytes. Presently, we produce an estimated five exabytes of data every two days. Consequently, some authors state that data is changing everything, and that the ability to both understand and manipulate data is increasingly becoming critical to present and future technological advancements, innovations, and discoveries. Berman *et al Realizing the Potential of Data Science* 2.

<sup>2090</sup> Cao 2017 *ACM Comput Surv* 2.

<sup>2091</sup> See para 1.6 above.

<sup>2092</sup> These disciplines enable what is called "data science thinking". Cao 2017 *Communications of the ACM* 60. The first mention of data science was likely in 1974, and was defined as: "The science of dealing with data, once they have been established, while the relation of the data to what they represent is delegated to other fields and sciences." See Naur *Concise Survey of Computer Methods*.

<sup>2093</sup> Data Science Association 2019 <http://www.datascienceassn.org/code-of-conduct.html>.

<sup>2094</sup> Berman *et al Realizing the Potential of Data Science* 2. The process of discovering trends, insights and knowledge from data is called "data mining". Data mining is achieved by making use of sophisticated data search tools and statistical algorithms and allows for the discovery of new meaning from data; see Data Science Association 2019 <http://www.datascienceassn.org/code-of-conduct.html>.



Big Data.<sup>2095</sup> Hence, Big Data<sup>2096</sup> forms an integral part of the purpose of data science. Taylor-Sakyi states that Big Data is understood as bulk sets of complex data, structured and unstructured, and as such cannot be processed by traditional processing algorithms or techniques.<sup>2097</sup> The author further holds that, since Big Data aims to identify and reveal trends and hidden patterns, it has led to an evolution from the previous model-driven science paradigm to a data-driven science paradigm.<sup>2098</sup>

A study undertaken by Boyd and Crawford,<sup>2099</sup> however, states that Big Data is a poor term. The authors hold that, although Big Data is frequently used to refer to massive sets of data that require the processing power of supercomputers,<sup>2100</sup> this is no longer the case.<sup>2101</sup> Due to the immense technological progress made regarding computer processing power, Big Data can now be processed by a desktop computer with standard software.<sup>2102</sup> Hence, it is argued that Big Data does not merely refer to the size of the data one encounters, but rather to the capacity it creates for the search, aggregation, and cross-referencing of enormous data sets.<sup>2103</sup> Therefore, the authors propose that Big Data should be understood as a technological, cultural and scholarly phenomenon that rests on the continuous interplay of technology, analysis, and mythology.<sup>2104</sup>

Intelligent water management technologies could be utilised to address the four specific challenges focused on in this study, namely, non-revenue water, illegal water connections, insufficient data, as well as the sustainability of water service provision.<sup>2105</sup> For instance, a significant part of non-revenue water is physical leaks, which result in

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<sup>2095</sup> Press 2013 <https://www.forbes.com/sites/gilpress/2013/05/28/a-very-short-history-of-data-science/#aee73ed55cfc>.

<sup>2096</sup> See para 1.6 above.

<sup>2097</sup> Taylor-Sakyi 2016  
[https://www.researchgate.net/publication/291229189\\_Big\\_Data\\_Understanding\\_Big\\_Data](https://www.researchgate.net/publication/291229189_Big_Data_Understanding_Big_Data).

<sup>2098</sup> Taylor-Sakyi 2016  
[https://www.researchgate.net/publication/291229189\\_Big\\_Data\\_Understanding\\_Big\\_Data](https://www.researchgate.net/publication/291229189_Big_Data_Understanding_Big_Data).

<sup>2099</sup> Boyd and Crawford 2012 *Information, Communication & Society* 663.

<sup>2100</sup> A supercomputer is defined as "an extremely powerful mainframe computer used for complex mathematical calculations demanding high speed and storage, e.g., weather forecasting"; Longley and Shain *Macmillan Dictionary of Information Technology* 323.

<sup>2101</sup> Manovich 2012 [http://www.manovich.net/DOCS/Manovich\\_trending\\_paper.pdf](http://www.manovich.net/DOCS/Manovich_trending_paper.pdf); Boyd and Crawford 2012 *Information, Communication & Society* 663.

<sup>2102</sup> Boyd and Crawford 2012 *Information, Communication & Society* 663.

<sup>2103</sup> Boyd and Crawford 2012 *Information, Communication & Society* 663.

<sup>2104</sup> Boyd and Crawford 2012 *Information, Communication & Society* 663.

<sup>2105</sup> See paras 3.3.1 – 3.3.4 above.

major water losses.<sup>2106</sup> As indicated by Farah and Shahrour, modern developments in intelligent water meter technology have improved the quantitative monitoring of water distribution and supply systems.<sup>2107</sup> A common approach by water providers is to implement smart water infrastructure, specifically in the form of smart water meters,<sup>2108</sup> to address physical leaks.<sup>2109</sup> This is because ICTs are generally available in cities, which is necessary for the function of smart water meters and automated meter reading systems (hereafter, AMRS). Water utilities are able to use ICTs, such as wireless or mobile networks, to obtain thousands of meter readings at different time intervals (ranging from hourly, or even every ten seconds) during the day.<sup>2110</sup> This innovation allows for increased accuracy in water consumption measurement, and leaks at the customer side of the meter can be identified by analysing consumption profiles.<sup>2111</sup> If an irregularity occurs, the water provider will be alerted immediately. Additionally, since the water utility has direct and remote access to such smart meters, fault detection in water meters can also occur much earlier.<sup>2112</sup>

Another example of how non-revenue water may be addressed is Aguas de Cascais, a water utility in Portugal. The utility's approach focuses on leakage management,<sup>2113</sup> since it automated its data analysis nearly a decade ago, reduced the metered area, and also introduced pressure management systems.<sup>2114</sup> Data from leaks were overlaid on Google Earth and provided to leakage management teams, after which a leakage database was developed, which allowed it to continuously establish water losses with accuracy.<sup>2115</sup> Furthermore, Aguas de Portugal, a government-owned water utility also utilised smart water meters to lower the non-revenue water in their area.<sup>2116</sup> The latter involved

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<sup>2106</sup> Farah and Shahrour 2018 *Analog Integrated Circuits and Signal Processing* 235; see para 3.3.1.1 above.

<sup>2107</sup> Farah and Shahrour 2018 *Analog Integrated Circuits and Signal Processing* 235.

<sup>2108</sup> See Owen "Domestic Water and Demand Management" 85 – 95; Van Zyl *et al Guidelines for the Evaluation and Selection of Advanced Water Metering Systems* 1 – 42.

<sup>2109</sup> Fanner *et al Leakage Management Technologies* xix – xxviii; see also Depuru, Wang and Devabhaktuni 2011 *Renewable and Sustainable Energy Reviews* 2736 – 2742; Owen "The Technologies and Techniques Driving Smart Water" 69 – 70.

<sup>2110</sup> Farah and Shahrour 2018 *Analog Integrated Circuits and Signal Processing* 235.

<sup>2111</sup> Farah and Shahrour 2018 *Analog Integrated Circuits and Signal Processing* 235.

<sup>2112</sup> Farah and Shahrour 2018 *Analog Integrated Circuits and Signal Processing* 239.

<sup>2113</sup> See para 3.3.1.1 above.

<sup>2114</sup> Owen "The Technologies and Techniques Driving Smart Water" 69 – 70.

<sup>2115</sup> Owen "The Technologies and Techniques Driving Smart Water" 69 – 70.

<sup>2116</sup> Owen "The Technologies and Techniques Driving Smart Water" 70 – 71.

continuous telemetry monitoring via the meters, continuous pressure and flow monitoring, and passive data collection connected to alert systems for anomaly detection.<sup>2117</sup> It also entailed the development of effective data analysis systems based on leak detection objectives that are processed via software to link information to any relevant performance indicators.<sup>2118</sup>

Similar to the above examples is the potential for detecting illegal water connections<sup>2119</sup> by utilising AI algorithms. Arguably, AI algorithms could form a part of the system envisioned above, especially since the increased frequency of data collected from smart water meters may enable the algorithm to function with more accuracy. The use of AI as part of intelligent water management technologies stems from the use of both data science and Big Data.<sup>2120</sup>

Jenny *et al* provide that by utilising state estimation and stochastic optimisation techniques, AI algorithms<sup>2121</sup> could make available spatial information concerning the type and amount of water losses in a City.<sup>2122</sup> Upon assigning a particular degree of uncertainty to existing data, the algorithm then attempts to determine the most likely status of the water network.<sup>2123</sup> In essence, the AI algorithm performs a continuous and probabilistic calibration of the network, rather than the standard deterministic, one-time calibration which allows it to analyse the *structure* of the errors perceived (meaning, the difference between actual measurements and the model predictions by the AI).<sup>2124</sup> This is done at each control point, and enables the algorithm to extract information from the error patterns.<sup>2125</sup>

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<sup>2117</sup> Owen "The Technologies and Techniques Driving Smart Water" 71.

<sup>2118</sup> Owen "The Technologies and Techniques Driving Smart Water" 71.

<sup>2119</sup> See para 3.3.2 above.

<sup>2120</sup> See the discussion on data science and Big Data in para 5.4.1.

<sup>2121</sup> AI entails a branch of computer science that deals with the simulation of specific intelligent behaviour in devices such as computers. In the context of water services, AI is mainly used to enhance decision-making, such as, ways in which cities could maximise data and information to make better decisions while also enhancing service provision, reducing operating costs and optimising capital investment. See Jenny *et al Using Artificial Intelligence for Smart Water Management Systems* 1 – 2.

<sup>2122</sup> Jenny *et al Using Artificial Intelligence for Smart Water Management Systems* 5. See paras 3.3.1.1 – 3.3.1.3 above.

<sup>2123</sup> Jenny *et al Using Artificial Intelligence for Smart Water Management Systems* 5.

<sup>2124</sup> Jenny *et al Using Artificial Intelligence for Smart Water Management Systems* 5.

<sup>2125</sup> Jenny *et al Using Artificial Intelligence for Smart Water Management Systems* 5.

The above means that, depending on the frequency and density of the measurements in each sector of the network, the algorithm can draw distinctions between different types of water losses, including whether the water loss is resultant of a leaking pipe or illegal water use.<sup>2126</sup> Arguably, integrating such an algorithm, in combination with smart water meters, could be a very useful way for cities to remotely detect illegal water connections. It could save the city both time and money in terms of deploying physical leak detection teams, prioritising pipe replacement initiatives, amongst other benefits. This approach could also be employed to aid to the sustainability of water services,<sup>2127</sup> since the algorithm can be used to detect abnormal readings, indicating issues such as equipment failure.<sup>2128</sup>

Often, by including the IoT, Big Data, ICTs, or smart infrastructure such as sensors or smart water meters as part of intelligent water management technology initiatives in cities, they are able to gather large volumes of data.<sup>2129</sup> On face value, this may solve the issue of a *lack* of data<sup>2130</sup> pertaining to certain aspects of water service provision. However, intelligent water management technologies could also be applied in nuanced ways to ensure data of good quality and data that have integrity.

For instance, one aspect of data quality is timeliness.<sup>2131</sup> As discussed above, timeliness is a significant issue regarding the data available on national databases,<sup>2132</sup> and this aspect could be addressed by, for instance, utilising the IoT, comprising pressure and flow sensors that are arranged in sensor nodes in a city's water pipe network to measure the water flow pattern in the pipe and pressure drops caused by leaks, amongst others.<sup>2133</sup> These measurements, in the form of data, can be conveyed with significant frequency from the sensor nodes to base stations via IoT gateways and to remote-processing control centres.<sup>2134</sup> To ensure the continuous and instant availability of such data, cloud

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<sup>2126</sup> Jenny *et al* *Using Artificial Intelligence for Smart Water Management Systems* 5.

<sup>2127</sup> See para 3.3.4 above.

<sup>2128</sup> Jenny *et al* *Using Artificial Intelligence for Smart Water Management Systems* 5.

<sup>2129</sup> This is due to the nature of these technologies; see the discussion thereon in para 5.4.1.

<sup>2130</sup> See para 3.3.3 above.

<sup>2131</sup> See para 3.3.3 above.

<sup>2132</sup> See para 3.3.3 above.

<sup>2133</sup> Adedeji *et al* 2019 *IEEE* 3.

<sup>2134</sup> Adedeji *et al* 2019 *IEEE* 3.

computing<sup>2135</sup> could be utilised, and subsequent processed data could also be stored in the cloud.<sup>2136</sup> As such, a city will be able to continuously monitor the infrastructure and address failures or faults that may be reported in the system to ensure the sustainability of water service provision.<sup>2137</sup> Most importantly, though, the issue of data timeliness<sup>2138</sup> may be addressed in this manner.

As far as the issue of data integrity is concerned,<sup>2139</sup> intelligent water management technologies could be applied in many innovative ways to ensure that data are complete and entirely unimpaired. For example, in cases of users tampering with smart water meters, or to prevent the overall tampering with data obtained from any other intelligent water management technology, one could apply what is known as a "cryptographic hash function".<sup>2140</sup> Essentially, a cryptographic hash function (a mathematical computation) is understood as an algorithm that can be applied to data such as an individual file or a password to provide a value called a "checksum".<sup>2141</sup> These hash functions are used to verify the authenticity of data by comparing the two checksums from each file, using the specific cryptographic hash function applicable, to determine if the files are identical.<sup>2142</sup> If *any* data has been altered after the creation of the checksum from the original file by using the hash function, the checksum on the file will be different from the original checksum.<sup>2143</sup>

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<sup>2135</sup> There are countless definitions of what exactly cloud computing entails. For instance, cloud computing is understood as a "distributed computing paradigm" that aims to provide a broad range of users with distributed access to virtualised, scalable, hardware or software through the internet. See Lewis *Basics About Cloud Computing* 1. Some technologies may be viewed as "cloud enablers", such as virtualisation, monitoring systems, open-source software, distributed storage, and distributed databases, and are considered the cornerstones of cloud computing infrastructure. See Gorelik *Cloud Computing Models* 8.

<sup>2136</sup> Adedeji *et al* 2019 *IEEE* 3 – 4.

<sup>2137</sup> See para 3.3.4 above.

<sup>2138</sup> See para 3.3.3 above.

<sup>2139</sup> See para 3.3.3 above.

<sup>2140</sup> See Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 4.

<sup>2141</sup> Cryptographic hash functions, as the name suggests, intersects with the scientific domains of mathematics and cryptography. See the hashing process explained in technical detail by Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 44; Mironov *Hash Functions: Theory, attacks, and applications* 1 - 6; see also Silva *An Overview of Cryptographic Hash Functions and Their Uses* 1 – 9; Aumasson *et al The Hash Function BLAKE* 1 - 2.

<sup>2142</sup> Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 3 – 66; Aumasson *et al The Hash Function BLAKE* 1 -2.

<sup>2143</sup> Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 3 – 66; Fisher 2020 <https://www.lifewire.com/cryptographic-hash-function-2625832>.

As such, utilising cryptographic hash functions in, for example, smart water meters will assist cities in determining if the data they are viewing is original and unimpaired. This technology may be seen as a *supporting* technology in this instance, and could be incorporated with most intelligent water management technologies that involve the measuring, storing and conveyance of data, and is a reliable way to ensure data integrity.<sup>2144</sup> This is especially so, because cryptographic hash functions are designed in such a way that they cannot be reversed or otherwise manipulated, since they are deterministic by nature.<sup>2145</sup>

In terms of the sustainability of water service provision,<sup>2146</sup> by utilising intelligent water management technologies, advanced monitoring may be employed,<sup>2147</sup> which will provide cities with alerts as to infrastructure that is in disrepair. Furthermore, cities will gain general information as to the use and operation of the infrastructure, which will be significant in the continuous maintenance thereof, as well as drafting future infrastructure operation plans.<sup>2148</sup> The availability of information of this kind could assist cities in making decisions regarding the construction or development of new infrastructure, the quality of current infrastructure, as well as improve cities' water needs analysis of their community.<sup>2149</sup> Innovations of this nature is also important for accurately portraying the status of access to water in the country.

The next section seeks to determine whether specific South African cities have turned to utilising innovation and intelligent water management technologies, specifically as a part of their function to provide water services to communities. This will allow one to determine what has been done in cities, and could lead to identifying opportunities as to

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<sup>2144</sup> This is because cryptographic hash functions are used for information authentication, which refers to protecting the information in sources or of the sources of the data or information in the communication from any modification by 3<sup>rd</sup> parties or unauthorised parties; Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 4.

<sup>2145</sup> Gauravaram *Cryptographic Hash Functions: Cryptanalysis, Design and Applications* 3 – 66; Fisher 2020 <https://www.lifewire.com/cryptographic-hash-function-2625832>.

<sup>2146</sup> See para 3.3.4 above.

<sup>2147</sup> By utilising, for example, sensors to facilitate advanced monitoring. See para 5.4.1.

<sup>2148</sup> See para 3.3.4 above.

<sup>2149</sup> See para 3.3.4 above.

what can still be done to address water services challenges towards realising the constitutional water right.

#### ***5.4.2 Intelligent water management technologies in specific South African cities: an overview***

The more considerable the growth of urban residential areas, the more significant the need to bridge the social, digital, and economic divide while focusing on innovation and sustainability.<sup>2150</sup> Therefore, some authors suggest the need to enable the latter through utilising emerging paradigms of ICTs, such as the IoT, data-driven services, and AI.<sup>2151</sup> According to the South African Local Government Association (hereafter, SALGA), the integration of innovation and technologies is proposed via the "smart city"<sup>2152</sup> concept.<sup>2153</sup> SALGA defines the "smart city" as one that uses digital technologies to improve well-being and performance, to reduce resource consumption and reduce costs, as well as to engage actively and effectively with its community.<sup>2154</sup> It proposes that the "key smart sectors" that smart cities should focus on are energy, healthcare, transport, waste, and water.<sup>2155</sup> Furthermore, it is suggested that developing countries need to take "smart

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<sup>2150</sup> Kar *et al* 2019 *Information Systems Frontiers* 496.

<sup>2151</sup> Kar *et al* 2019 *Information Systems Frontiers* 496.

<sup>2152</sup> The notion of "smart", as applied to utilities, public and environmental services, may be defined as the applying of data monitoring, transmission, management and presentation of services in a way that boosts the efficient use of their operational assets. Furthermore, it encompasses data management and ICTs for environmental services and public utilities; see Owen "What do we Mean by "Smart Water" 1.

<sup>2153</sup> SALGA *Smart Cities* 5. For an in-depth discussion of smart cities globally, see generally Kim, Soheil, and Kent *Smart Cities for Technological and Social Innovation*; Vacca *Solving Urban Infrastructure Problems Using Smart City Technologies: Handbook on Planning, Design, and Regulation*. Anthopoulos contends that the definition of a smart city is much more complex; see Anthopoulos "The Rise of the Smart City" 1 – 36.

<sup>2154</sup> SALGA *Smart Cities* 5. According to Ejaz and Anpalagan, the notion of the "smart city" was introduced as a potential solution to the problems presented by urbanisation. Smart cities involve the utilisation of ICTs to improve the quality of urban life including reduced resource and cost consumption. The recent convergence of ICT with the IoT has been envisioned to provide new features with a minimum amount of intervention in smart cities. See Ejaz and Anpalagan *Internet of Things for Smart Cities: Technologies, Big Data and Security* 1. For the evolution, history, technological innovation, social innovation, smart city drivers and actors, see generally Kim, Soheil, and Kent "Smart cities as a platform for technological and social innovation in productivity, sustainability, and livability: A conceptual framework".

<sup>2155</sup> SALGA *Smart Cities* 5. Smart solutions that are commonly utilised to improve the operations of a city may entail electricity grids, traffic management, public transit and water production and consumption; Ejaz and Anpalagan *Internet of Things for Smart Cities: Technologies, Big Data and Security* 1.

thinking" further than merely incorporating technologies such as broadband connections.<sup>2156</sup>

While SALGA suggests that smart city-interventions may impact many municipal services,<sup>2157</sup> it recognises that every city has different priorities and needs.<sup>2158</sup> Regarding the issue of water, SALGA posits that access to fresh water is integral to especially densely populated areas, and addressing issues such as billing failures that lead to inefficient payment collection can reduce a city's budget for both maintenance and purification. As such, these challenges need to be addressed adequately.<sup>2159</sup> Therefore, it is suggested that technological innovations, such as smart water meters, could assist cities in solving these problems.<sup>2160</sup> Communities are also encouraged to play a part by reporting water leaks through smart reporting tools to prevent water losses.<sup>2161</sup>

The section below seeks to determine if and how cities have approached the implementation of intelligent water management technologies. The latter includes the facilitation thereof through broad policy, planning, or strategy initiatives.<sup>2162</sup> This section focuses specifically on the CoJ, the eMM, and the NMBMM.

#### *5.4.2.1 The City of Johannesburg*

The development of broadband networks, wireless broadband technology, or Wi-Fi, as well as free municipal public hotspots, are fundamental to improve service delivery in cities,<sup>2163</sup> chiefly when the implementation of additional innovations and technologies such as intelligent water management technologies are concerned. The CoJ has focused its

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<sup>2156</sup> SALGA *Smart Cities* 5. Some authors suggest that the next step after "smart cities" is the development of "digital smart nations"; see Kar *et al* 2019 *Information Systems Frontiers* 495 – 501.

<sup>2157</sup> This is especially so, since *smart city governance* entails cooperation, collaboration, community engagement, partnerships, and participation in the decision-making processes and the management of the city, which may have both significant benefits and drawbacks for the delivery of services in municipalities; see López-Quiles and Bolívar "The Need of Smart Technologies for Smart Governments" 4.

<sup>2158</sup> SALGA *Smart Cities* 6.

<sup>2159</sup> SALGA *Smart Cities* 6.

<sup>2160</sup> SALGA *Smart Cities* 6.

<sup>2161</sup> SALGA *Smart Cities* 6.

<sup>2162</sup> For more on the global discourse concerning the new generation of "policy-aware smart cities research" aimed at improving innovation and socially inclusive development for sustainability, see Visvizi *et al* 2018 *Journal of Science and Technology Policy Management* 126 – 133.

<sup>2163</sup> Kulikov Wireless Solutions (Pty) Ltd *Municipal Wi-Fi as Public Service Delivery Platform* 5.



attention since 2003, on the potential of broadband networks to add value to the City and adopted a *Broadband Strategy Roadmap* in 2005, followed by a *Broadband Investment Model* in 2007.<sup>2164</sup> Realising the emergence of broadband as a powerful resource globally and the increasing demand for high-speed and affordable internet connectivity by South African consumers, the CoJ adopted a *Broadband Policy Framework* in 2009.<sup>2165</sup> The purpose of the latter instrument was to facilitate increased levels of broadband and ICT usage and, for instance, to develop consumer services and clarify the City's stance on the extension of broadband networks across the City.<sup>2166</sup>

Reflecting on how access to broadband infrastructure will benefit the City government itself, the *Broadband Policy Framework* states that it can enable greater efficiency as to information management and provide cost-effective network access for emergency services and disaster management, and promoting e-government.<sup>2167</sup> The Framework provided for the initiation of an ICT-for-development scheme for the informal and marginalised areas in the City, which aimed to give high-speed access to such areas in the five to ten years following the Framework's adoption.<sup>2168</sup> Since 2020, the CoJ has revisited the rollout of free Wi-Fi services via hotspots as an essential service and is deploying next-generation Wi-Fi city-wide.<sup>2169</sup>

The aforementioned is part of the City's plan to transform itself into a globally competitive digital smart city, which will allow it to manage, for instance, utilities and the environment through technologies.<sup>2170</sup> Arguably, the City's commitment to establishing a wide-spread network or internet access is essential for intelligent water management technologies.<sup>2171</sup>

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<sup>2164</sup> *City of Johannesburg Broadband Policy Framework* of 2009 1.

<sup>2165</sup> *City of Johannesburg Broadband Policy Framework* of 2009 1.

<sup>2166</sup> *City of Johannesburg Broadband Policy Framework* of 2009 vi.

<sup>2167</sup> *City of Johannesburg Broadband Policy Framework* of 2009 2.

<sup>2168</sup> *City of Johannesburg Broadband Policy Framework* of 2009 13.

<sup>2169</sup> CoJ 2020  
[https://www.joburg.org.za/media\\_/Newsroom/Pages/2020%20News%20Articles/October%202020/Joburg-rolls-out-cutting-edge-Wi-Fi-network.aspx](https://www.joburg.org.za/media_/Newsroom/Pages/2020%20News%20Articles/October%202020/Joburg-rolls-out-cutting-edge-Wi-Fi-network.aspx).

<sup>2170</sup> CoJ 2020  
[https://www.joburg.org.za/media\\_/Newsroom/Pages/2020%20News%20Articles/September%202020/Joburg-ignites-free-Wi-Fi-hotspots-to-entrench-new-normal.aspx](https://www.joburg.org.za/media_/Newsroom/Pages/2020%20News%20Articles/September%202020/Joburg-ignites-free-Wi-Fi-hotspots-to-entrench-new-normal.aspx).

<sup>2171</sup> See para 5.4.1 above.

Thus, the CoJ, in this manner, contributed to the uptake of such technologies by establishing an enabling environment.

The commitment by the City to establish publicly accessible and wide-spread access to the internet forms part of the *Joburg 2040 Growth and Development Strategy*.<sup>2172</sup> The Strategy confirms that technological innovation is driving unexpected, fast, and unpredictable changes in the economy, society, nature, and politics and that cities are the ones driving the new revolution of ICTs, and have a duty to, amongst others, ensure efficient technology transfer to the rest of the economy.<sup>2173</sup> Notably, the *Joburg 2040 Growth and Development Strategy* requires the CoJ to focus on becoming a smart city, and to use ICTs as an enabler to merge dimensions of smart utilities, smart planning, and smart governance.<sup>2174</sup> The vision of the CoJ becoming a smart city, as portrayed in the *Joburg 2040 Growth and Development Strategy*, is reflected in the strategic priorities of the City's IDP's.<sup>2175</sup> Additionally, a main outcome of the Strategy is to create a City that focuses on driving a responsive, caring, efficient, and progressive service delivery and developmental approach within its metropolitan space.<sup>2176</sup>

The most recent *Integrated Development Plan 2020/21* identifies the City's strategic priority ten as the focus on becoming a smart city. The kind of smart city envisioned by the latter IDP is one where the City focuses on the use of blockchain, the IoT, robotics, AI, serious gamification, machine learning, and automated data collection to deliver effective and efficient services to the community.<sup>2177</sup> A smart city is seen as one where attention is paid to both technological and social innovation and where communities collaborate with local governments to improve their standard of living and service delivery through an "innovation ecosystem where technology is leveraged".<sup>2178</sup>

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<sup>2172</sup> *Joburg 2040 Growth and Development Strategy* of 2011 6 – 7.

<sup>2173</sup> *Joburg 2040 Growth and Development Strategy* of 2011 6 – 7.

<sup>2174</sup> *Joburg 2040 Growth and Development Strategy* of 2011 81 – 87.

<sup>2175</sup> *The City of Johannesburg Draft Integrated Development Plan 2020/21* 2.

<sup>2176</sup> *Joburg 2040 Growth and Development Strategy* of 2011 9.

<sup>2177</sup> The CoJ *Draft Integrated Development Plan 2020/21* 199.

<sup>2178</sup> The CoJ *Draft Integrated Development Plan 2020/21* 199.

The IDP continues to refer back to the *Leap into our Future: Joburg Smart City Strategy* that provides for eight strategic pillars towards establishing a "Smart Joburg City".<sup>2179</sup> These pillars include smart citizens, smart services; safe city; liveable, sustainable, and resilient city; connected, intelligent city; smart governance; smart institution; and smart, digital economy.<sup>2180</sup> While these pillars do not directly address intelligent water management technologies, some pillars proffer technological innovations that are part and parcel of such water-related technologies.<sup>2181</sup>

Under the smart citizen pillar, it is envisioned that the community is placed at the centre of all initiatives. Thus, systems and digital platforms must be built for communities to engage with the City, share their experiences, report issues, and comment on the City's service delivery.<sup>2182</sup> Such systems will provide real-time alerts to communities pertaining to problems such as water closures. They will be enabled by ensuring that communities have continuous access to innovative, efficient, and affordable services via digital platforms and technologies and "kiosks" powered by free Wi-Fi in public spaces.<sup>2183</sup>

Of particular relevance to this study is the smart services pillar. In terms of this pillar, the CoJ recognises that traditional service delivery methods may be considered antiquated and lacks the adaptability required to meet the City's growing population and demands.<sup>2184</sup> As such, water services, for example, must become automated to make these services more accessible and to a broader population and deliver services speedier, as well as resolve issues and queries with greater efficiency.<sup>2185</sup> Therefore, it is suggested that the CoJ must evolve into a 24/7 "queue-less" city, with services available on-demand and anywhere, by utilising web-based and mobile community portals.<sup>2186</sup> Services must be rendered via innovative means and within walking distances of the residences of communities.<sup>2187</sup> The latter is, arguably, especially applicable to water services, given that

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<sup>2179</sup> The CoJ *Draft Integrated Development Plan 2020/21* 201.

<sup>2180</sup> The CoJ *Draft Integrated Development Plan 2020/21* 201.

<sup>2181</sup> The CoJ *Draft Integrated Development Plan 2020/21* 201.

<sup>2182</sup> The CoJ *Draft Integrated Development Plan 2020/21* 201.

<sup>2183</sup> The CoJ *Draft Integrated Development Plan 2020/21* 201.

<sup>2184</sup> The CoJ *Draft Integrated Development Plan 2020/21* 202.

<sup>2185</sup> The CoJ *Draft Integrated Development Plan 2020/21* 202.

<sup>2186</sup> The CoJ *Draft Integrated Development Plan 2020/21* 202.

<sup>2187</sup> The CoJ *Draft Integrated Development Plan 2020/21* 202.

not everyone has access to in-home and piped connections. Finally, the IDP, at the hand of the *Smart City Strategy*, envisions complete Wi-Fi roll-out, the utilisation of the Joburg App to improve service delivery, as well as push-alerts that may warn the community of the interruption of services.<sup>2188</sup>

While there are numerous other innovative measures envisioned by the CoJ to redesign itself as a smart city,<sup>2189</sup> the above technological innovations and ideas relate to intelligent water management technologies in broad terms only. From the sources available on the City's water provider, Johannesburg Water, one may discern that the CoJ has installed 5000 smart water meters, which constitutes an intelligent water management technology.<sup>2190</sup> Further than that, Johannesburg Water is committed to research, development, and innovation as an avenue to improve their services, efficiency, and effectiveness.<sup>2191</sup>

As part of its objectives in terms of innovation and technology, it aims to execute the Smart Cities Programme of the CoJ, improve the management of water demand via appropriate technologies, as well as manage challenges within the water sector by partaking in technology demonstrations as well as national research programmes, amongst other issues.<sup>2192</sup> Finally, Johannesburg Water also runs certain programmes that do not utilise intelligent water management technologies, but that may be optimised by doing so. For instance, Johannesburg Water has an "active leak detection programme" that involves 15 teams who do active leak detection daily to reduce water wastage within the city.<sup>2193</sup> While the team reports visible leaks via a digital system and utilises "acoustic

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<sup>2188</sup> The CoJ *Draft Integrated Development Plan 2020/21* 202.

<sup>2189</sup> See for instance the suggestions under the connected, intelligent city; smart governance; and smart institution; The CoJ *Draft Integrated Development Plan 2020/21* 201 – 205; see also The CoJ *Final Integrated Development Plan Review 2020/21* 130 – 132.

<sup>2190</sup> Johannesburg Water 2019 <https://johannesburgwater.co.za/final-verification-of-smart-water-meters-at-cosmo-city/>; Johannesburg Water 2020 <https://johannesburgwater.co.za/cosmo-city-smart-meters-activation-meeting/>.

<sup>2191</sup> Johannesburg Water 2020 <https://johannesburgwater.co.za/about-us/innovationtechnology/>.

<sup>2192</sup> For the full list of objectives, see Johannesburg Water 2020 <https://johannesburgwater.co.za/about-us/innovationtechnology/>.

<sup>2193</sup> Johannesburg Water 2020 <https://johannesburgwater.co.za/active-leak-detection-programme/>.

listening sticks" to determine leaks that are not visible, no other apparent technology is utilised.<sup>2194</sup>

Arguably, this programme may benefit from the inclusion of intelligent water management technologies.<sup>2195</sup> The latter could allow for real-time leak detection by incorporating sensors in the pipe infrastructure network, and could assist the City in accurately anticipating new leaks by utilising predictive analytics. Furthermore, these types of intelligent water management solutions or interventions could assist the CoJ in planning, for instance, for the life-cycle operation and maintenance costs of such infrastructure with precision.

#### *5.4.2.2 The eThekweni Metropolitan Municipality*

In 2014, the eMM<sup>2196</sup> received the Stockholm Industry Water Award for its inclusive and transformative approach to providing both water and sanitation services, and for contributing to sustainable water management.<sup>2197</sup> According to the City, one of its strengths is recognising the value in supporting the roll-out of in-depth water and sanitation research programmes, technological support and data collection.<sup>2198</sup> The emphasis on technology is also brought forward in the eMM's *Economic Development and Job Creation Strategy 2013 – 2018*,<sup>2199</sup> where it states that, to drive growth in the City over the following 20 years, it is necessary to pay attention to growth opportunities such as capitalising on, for example, the role of the port, infrastructure, and ICTs.<sup>2200</sup> The latter Strategy continues by noting that information technology (hereafter, IT) connectivity is fundamental to the City's global competitiveness, and that the eMM must continue to establish a fibre-optic network that creates a cost-effective and high-speed platform to

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<sup>2194</sup> Johannesburg Water 2020 <https://johannesburgwater.co.za/active-leak-detection-programme/>.

<sup>2195</sup> See para 5.5 below.

<sup>2196</sup> See para 4.5.2 above.

<sup>2197</sup> eThekweni Water & Sanitation *Most innovative and progressive water utility in Africa: Selected Highlights 7*.

<sup>2198</sup> eThekweni Water & Sanitation *Most innovative and progressive water utility in Africa: Selected Highlights 7*.

<sup>2199</sup> The eMM *Economic Development and Job Creation Strategy 2013 – 2018* 2013 35.

<sup>2200</sup> See the eMM *Municipal Spatial Development Framework 2017/2018 – 2021/2022* 2017 144.

promote e-government, business development, as well as technology and skills development.<sup>2201</sup>

The City also boasts a significant focus on innovation and established an innovation programme, known as Innovate Durban.<sup>2202</sup> The programme's aim is to find ways of turning research into practice, while gaining knowledge concerning real world aspirations, needs and problems.<sup>2203</sup> This programme was also borne out of the eMM's understanding that innovative solutions regarding challenges in the community may be generated from the creativity of members of the community.<sup>2204</sup> Additionally, the City recognises its reputation as a "green city" and endeavours to further this by developing, marketing and commercialising novel and innovative technologies in this regard.<sup>2205</sup>

Some examples exist of the eMM utilising intelligent water management technologies. Firstly, upon the establishment of the Centre of Expertise,<sup>2206</sup> several projects were developed by innovators and showcased by the host utility.<sup>2207</sup> The latter includes projects that collect existing or current data from different data sources to create integrated reports and to advise the City on possible additional optimisation software and sensors.<sup>2208</sup> The pilot projects were directed at specific water supply areas, and used the information from flow and pressure measurements, GIS, the job card system and call centre data.<sup>2209</sup> In addition, specific water treatment works were also considered in these projects, with a focus on work and lab orders, as well as data from Supervisory Control and Data Acquisition (hereafter, SCADA) systems.<sup>2210</sup> Due to this study being desktop-based, some difficulties were experienced in finding information to confirm whether these projects were further implemented, or if they were successful, and to what extent.

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<sup>2201</sup> The eMM *Economic Development and Job Creation Strategy 2013 – 2018* 2013 51.

<sup>2202</sup> The eMM *The Edge* 6. Innovate Durban *iInnovation: The State of Innovation in KZN*.

<sup>2203</sup> The eMM *The Edge* 6.

<sup>2204</sup> The eMM *The Edge* 6.

<sup>2205</sup> The eMM *Economic Development and Job Creation Strategy 2013 – 2018* 2013 62.

<sup>2206</sup> The Centre of Expertise is a collaborative project among the eMM, the Dutch Government, World Waternet, Vitens Evides International, World Water Academy. The eMM 2013 [http://www.durban.gov.za/Resource\\_Centre/new2/Pages/Centre-Of-Expertise-Launched.aspx](http://www.durban.gov.za/Resource_Centre/new2/Pages/Centre-Of-Expertise-Launched.aspx).

<sup>2207</sup> Meijer and Govender "Centre of Expertise – Water Unlocked?" 127.

<sup>2208</sup> Meijer and Govender "Centre of Expertise – Water Unlocked?" 127.

<sup>2209</sup> Meijer and Govender "Centre of Expertise – Water Unlocked?" 127.

<sup>2210</sup> Meijer and Govender "Centre of Expertise – Water Unlocked?" 127.

Soon after the launch of the Centre of Excellence, in a separate endeavour in 2014, the City was in the process of developing a "Smart City mobile application", rendering it one of the first cities to do so in South Africa.<sup>2211</sup> The application was aimed at integrating the range of services provided by the municipality, enabling it to act as a responsive service delivery tool that allows interaction between the municipality and the community in real-time.<sup>2212</sup> As such, it was envisioned that the application would shorten queues and provide speedier responses to serve delivery issues.<sup>2213</sup> The development of the application was said to form a part of the eMM's broad "Integrated Service Management" e-government solution.<sup>2214</sup> The latter involves Big Data, the IoT, mobility and the Cloud to facilitate the use of advanced service delivery management software.<sup>2215</sup> While it seems the first app was called "Smart Community",<sup>2216</sup> in attempting to find the application on the relevant platforms, namely, Google Play<sup>2217</sup> and the Apple App Store,<sup>2218</sup> the only application available is one called "eThekweni Municipality" that was released in 2019.

Based on the information available on both platforms, the application has received predominantly bad reviews.<sup>2219</sup> Mostly, users have indicated that the application is faulty and often not usable, does not have diverse functions, and is often incapable of, for

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<sup>2211</sup> SALGA *Smart Cities* 13; Petterson 2014 <https://infrastructurenews.co.za/2014/08/11/smart-city-app-to-reinvigorate-service-delivery/>.

<sup>2212</sup> The eMM 2016 [http://www.durban.gov.za/Resource\\_Centre/new2/Pages/Smart-City-App.aspx](http://www.durban.gov.za/Resource_Centre/new2/Pages/Smart-City-App.aspx).

<sup>2213</sup> My Durban 2016 <https://mydurban.co.za/a-smart-city-app-for-ethekweni/>.

<sup>2214</sup> SALGA *Smart Cities* 13; Petterson 2014 <https://infrastructurenews.co.za/2014/08/11/smart-city-app-to-reinvigorate-service-delivery/>.

<sup>2215</sup> Petterson 2014 <https://infrastructurenews.co.za/2014/08/11/smart-city-app-to-reinvigorate-service-delivery/>.

<sup>2216</sup> The initial application was developed by Dynatech; see Dynatech 2015 [http://www.dynatech.co.za/?page\\_id=1860](http://www.dynatech.co.za/?page_id=1860). However, according to the current information on the relevant application platforms, the developer is the XET Group; see Google Play 2020 [https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en\\_ZA&gl=US&showAllReviews=true](https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en_ZA&gl=US&showAllReviews=true); the XET Group 2020 <http://www.xetgroup.com/index.php>.

<sup>2217</sup> Google Play 2020 [https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en\\_ZA&gl=US&showAllReviews=true](https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en_ZA&gl=US&showAllReviews=true).

<sup>2218</sup> Apple App Store 2020 <https://apps.apple.com/za/app/ethekweni-municipality/id1463192796>.

<sup>2219</sup> Google Play 2020 [https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en\\_ZA&gl=US&showAllReviews=true](https://play.google.com/store/apps/details?id=municipality.eThekweni&hl=en_ZA&gl=US&showAllReviews=true); Apple App Store 2020 <https://apps.apple.com/za/app/ethekweni-municipality/id1463192796>.

instance, generating utility bills.<sup>2220</sup> Therefore, while the development of this smart mobile application may be commendable, its implementation proves less than desirable.

From the above, one may conclude that while the eMM is willing to embrace innovation and technology, the use of intelligent water management technologies does not seem to be widespread. The available examples also do not provide much insight as to the current state of the uptake of intelligent water management technologies in the City. As may be observed, a core difference between the CoJ and the eMM's approach to utilising or embracing innovation and technology is the CoJ's development of policies and strategies that aim to facilitate the uptake of innovation and technology,<sup>2221</sup> compared to the eMM's approach that mainly consists of establishing centres, institutions and programmes directed at doing the same. Although both are useful, a discernible issue with the eMM's approach is that, while it creates an enabling environment (or rather several enabling environments) it seems to have resulted in the fragmented development of different projects, and finding information concerning the current status or uptake of technologies is rendered particularly difficult. There is a lack of meaningful and useful resources and information in this regard, especially since most information is provided via news articles on the eMM website.

#### *5.4.2.3 The Nelson Mandela Bay Metropolitan Municipality*

At the time of this study, the NMBMM is experiencing the worst drought and water shortages ever recorded in its history, and residents are encouraged to use water responsibly.<sup>2222</sup> According to the *Long-term Growth and Development Plan 2017 – 2032*, the City recognises that to provide reliable infrastructure and services, it must find more efficient solutions.<sup>2223</sup> The latter comprises improving the NMBMM IT systems and setting

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<sup>2220</sup> Google Play 2020  
[https://play.google.com/store/apps/details?id=municipality.eThekwini&hl=en\\_ZA&gl=US&showAllReviews=true](https://play.google.com/store/apps/details?id=municipality.eThekwini&hl=en_ZA&gl=US&showAllReviews=true); Apple App Store 2020 <https://apps.apple.com/za/app/ethekwini-municipality/id1463192796>.

<sup>2221</sup> See para 4.4.4.1 above.

<sup>2222</sup> See para 4.5.3 above. See also the NMBMM *Integrated Development Plan 2017/18 – 2021/22* 2019 29.

<sup>2223</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 73.



up an enabling environment to apply technologically revolutionary solutions, specifically by utilising the IoT and other technologies inherent to smart cities.<sup>2224</sup>

Therefore, the Plan states that the future of the City will be planned in accordance with smart city concepts.<sup>2225</sup> Such an approach entails utilising technology and innovation to improve the lives of persons in the community, utilising ICTs to provide more efficient and effective services, including water services, and modernising infrastructure.<sup>2226</sup> The NMBMM acknowledges that an immediate priority is for the City to become data-driven, including determining ways to collect, collate and store data and make information available that could stimulate better decision-making.<sup>2227</sup> The municipality also recognises that the aforementioned is necessary, because it allows for data analytics and technology which may provide it with insight and knowledge that could improve the socio-economic development and physical management of the City.<sup>2228</sup> Of significance is that stabilising the water supply is seen as an immediate priority for the NMBMM, particularly in terms of its potential for improvement by integrating smart water options.<sup>2229</sup>

The *Long-term Growth and Development Plan 2017 – 2032* illustrates that the City has a firm grasp on how intelligent water management technologies, as part of smart city initiatives, could address many of the challenges it faces.<sup>2230</sup> It also shows significant insight by the City as to the integral role of data, as well as their role in the development of a smart city, namely: involving the research and integration of various innovations and technologies, connecting service providers and stakeholders, determining new standards, developing public-private-academic partnerships, and developing the capacity of municipal employees for data-driven development.<sup>2231</sup>

The Plan also addresses the issue of the "silo-mentality" that often exists in municipalities. On this, the *Long-term Growth and Development Plan 2017 – 2032* proposes that the

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<sup>2224</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 73 – 74.  
<sup>2225</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.  
<sup>2226</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.  
<sup>2227</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74 – 77.  
<sup>2228</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.  
<sup>2229</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.  
<sup>2230</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.  
<sup>2231</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 74.

NMBMM will have to discard this approach, and focus on sharing data, information and insights, prevent costly duplication, and establish an intolerance of un-coordinated service delivery.<sup>2232</sup> Finally, it is stated that the City must develop strategies and policies to create preparedness for future technologies and lobby for national policy amendments should it be a hindrance.<sup>2233</sup>

The proper implementation of the actions envisioned in the ambitious Plan discussed above may be regarded as essential for the City to overcome issues such as the current immense water scarcity, improving service delivery and addressing complex water provision challenges.<sup>2234</sup> In comparison to the approaches and initiatives from the two cities discussed above, the *Long-term Growth and Development Plan 2017 – 2032* may arguably be identified as the most ambitious, insightful and comprehensive initiative towards utilising intelligent technologies, data, innovation, and concepts inherent to the understanding of smart cities. Additionally, as will be discussed below, the NMBMM has already achieved the uptake of certain intelligent water management technologies, and has established further initiatives to drive forward, for instance, the integration of smart infrastructure.

To address the water issues in the City, it has, for instance, as an intervention to non-revenue water,<sup>2235</sup> identified remote water metering, which entails using Advanced Metering Infrastructure (hereafter, AMI).<sup>2236</sup> The AMI is aimed at enhancing water meter readings to ensure precise billing.<sup>2237</sup> This initiative commenced in 2017, and in addition, a service provider has installed General Packet Radio Service<sup>2238</sup> (hereafter, GPRS) loggers<sup>2239</sup> at 74 different District Metered Areas (hereafter, DMAs) that allows for real-

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<sup>2232</sup> The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 76.

<sup>2233</sup> For the several actions and phases envisioned as part of establishing the NMBMM as a smart city, see The NMBMM *Long-term Growth and Development Plan 2017 – 2032* 2017 77 – 78.

<sup>2234</sup> See para 4.5.3 above.

<sup>2235</sup> See para 3.3.1 above.

<sup>2236</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 172, 175.

<sup>2237</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 172, 175.

<sup>2238</sup> GPRS allow users to open a persistent data connection, and establishes system architecture that allows for carrying data traffic via mobile networks; see Beard and Stallings *Wireless Communication Networks and Systems* 435.

<sup>2239</sup> GPRS loggers allow for the collection of telemetry data, and enables stand-alone functioning of measurement places. These loggers transmit recorded data to the "Device to Web" portal via GPRS,

time flow monitoring.<sup>2240</sup> DMA water balances are said to provide integral information that may be used to determine priority areas for potential leak detection.<sup>2241</sup> In doing so, the NMBMM is able to react almost immediately to pipe leaks or bursts and is able to anticipate pipe failures.<sup>2242</sup> This is a significant example of the uptake of intelligent water management technologies in the NMBMM that has been conducted with relative success, and that has educated the City on the value of quick repair times, awareness, and the location of leaks and how it contributes to reducing non-revenue water.<sup>2243</sup> Furthermore, the implementation of these technologies by the NMBMM provides a practical and real-life illustration of how intelligent water management technologies could be utilised as an avenue to realise the constitutional water right by addressing significant challenges to water service delivery in Cities.

From 2017 onwards, the NMBMM has taken additional strides towards integrating technology and innovation in the City by engaging on the possibility of becoming a smart city. In March 2017, 50 different representatives of the local government, civil society, universities, NGOs, and government engaged in a "first conversation" on the matter.<sup>2244</sup> Notably, the gathering identified the crucial opportunities for the NMBMM as a smart city. The latter includes nine aspects, such as connectivity (software and hardware facilitating data sharing); e-health; smart government (such as payment of utility bills, lowering of rates and other ways of improving the community's experience in relation to City services); smart infrastructure (including utilities, such as infrastructure and water supply); and the IoT (solutions related to Big Data, devices, mobile phones and applications, and sensors).<sup>2245</sup> Working groups, based on the latter aspects, focused on

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and are considered stable and reliable means of transmitting meter readings; see Nivus *GPRS Data Logger and D2W Internet Portal 2*.

<sup>2240</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 172, 175.

<sup>2241</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 172.

<sup>2242</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 175.

<sup>2243</sup> Raymer, Ross and Joubert "Nelson Mandela Bay Municipality Non Revenue Water Programme – 'Providing Sustainable Water Supply Services to Nelson Mandela Bay'" 175.

<sup>2244</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way 2*.

<sup>2245</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way 3*.

this in the second conversation and at the hand of certain key questions, such as, "what does the city have, need and feel about your working group focus?".<sup>2246</sup>

The "smart infrastructure" working group, occupied with matters related to water service delivery, amongst others, found that connectivity is a significant barrier in the City.<sup>2247</sup> Improved connectivity (by, for instance, establishing fibre networks) would prove vital, since smart devices require, among other elements, a connection to the internet to function.<sup>2248</sup> This may be considered essential for the future integration of intelligent water management technologies in the NMBMM. The working group identified that low awareness of smart infrastructure, fragmentation, the lack of a unified vision on smart infrastructure, and how information from the City's smart information reaches the community are all issues that must be addressed by the NMBMM to successfully rely on smart infrastructure in the future.<sup>2249</sup> Lastly, they found that the municipality's involvement is essential to the success of smart infrastructure, given that political will is considered key for its implementation as part of the NMBMM's smart city initiatives.<sup>2250</sup>

From the discussions among the working groups, it was determined that, ultimately, the NMBMM must develop a smart city strategy.<sup>2251</sup> Should this strategy be developed in line with the recommendations of the working groups, in addition to the actions and initiatives envisioned in the City's *Long-term Growth and Development Plan 2017 – 2032*, many innovative technological solutions may be provided for, which could drive forward its function as a water service provider. While many of the actions and technologies may be considered ambitious in comparison to those observed in other metropolitan municipalities in the country,<sup>2252</sup> debatably, this is necessary for the NMBMM to be able to develop the capacity it needs to overcome its many challenges.<sup>2253</sup> What is made clear through its commitments to becoming a smart city, is the significant benefit it presents for improving the NMBMM's water provision services, as well as how intelligent water

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<sup>2246</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 3.

<sup>2247</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 9.

<sup>2248</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 9.

<sup>2249</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 9.

<sup>2250</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 9.

<sup>2251</sup> Propella Business Incubator *Smart City Nelson Mandela Bay Starting Small in a Big Way* 13.

<sup>2252</sup> See paras 5.4.2.1 and 5.4.2.2 above.

<sup>2253</sup> See para 4.5.3 above.

management technologies could be implemented practically to address specific water provision challenges,<sup>2254</sup> such as non-revenue water.

## 5.5 Potential challenges and stumbling blocks

General challenges concerning the uptake of intelligent water management technologies as an *innovation* are provided for by the Presidential Commission on the Fourth Industrial Revolution in their recent report.<sup>2255</sup> The first challenge relates to institutional and operational capacity. To participate in the comprehensive scope of technological innovations, such as those brought on by the Fourth Industrial Revolution, institutional and operational capacity must be improved by restructuring current state resources (both institutional, financial and physical) and investing in new resources.<sup>2256</sup> The latter also involves the optimal participation of international, public, private, and local partnerships.<sup>2257</sup>

Secondly, the Commission emphasises the implementation of past approaches to current and future challenges and holds that there is a need for continuous *innovation*.<sup>2258</sup> Furthermore, the matter of the "digital divide", characterised by a lack of access to digital solutions due to issues such as insufficient mobile broadband networks, affordability, and access, is a major stumbling block when it comes to relying on intelligent water management technologies that entail the use of ICTs, amongst other technologies.<sup>2259</sup> Concerning the issue of the digital divide, the Commission relies on work done by the World Bank Group, which provides that<sup>2260</sup> –

Moreover, based on the findings, in specific areas such as broadband roll-out or government service digitalisation, the government appears to rely excessively on its resources and capacities, at times leading to inefficient, expensive and incomplete project implementation. Overall, there is room to consider leveraging more private investment and expertise in key areas such as infrastructure deployment, skills

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<sup>2254</sup> See para 5.4.1 above.

<sup>2255</sup> GN 591 in GG 43834 of 23 October 2020 164.

<sup>2256</sup> GN 591 in GG 43834 of 23 October 2020 164.

<sup>2257</sup> GN 591 in GG 43834 of 23 October 2020 164

<sup>2258</sup> GN 591 in GG 43834 of 23 October 2020 164.

<sup>2259</sup> GN 591 in GG 43834 of 23 October 2020 164.

<sup>2260</sup> GN 591 in GG 43834 of 23 October 2020 164; the World Bank Group *Draft Report: Digital economy for Africa* 19.

development and the roll-out of e-government platforms. This is especially pertinent in the context of the South African Government's commitment to fiscal consolidation.

While the World Bank Group's statement above encourages leveraging, for instance, private expertise, a specific issue that has particular bearing on the uptake of intelligent water management in cities is the issue of procurement. The current legislative environment concerning procurement in South Africa is complex,<sup>2261</sup> and cities' compliance with existing laws and policies is deemed a serious issue. While many challenges exist in municipalities regarding procurement,<sup>2262</sup> the main issue relevant to this study is that the procurement legislation makes limited provision for the procurement of innovations.<sup>2263</sup>

Arguably, section 217 of the *Constitution* that speaks to procurement, specifically section 217(2)(a), allows room for the promotion of the procurement of innovations.<sup>2264</sup> The sections mentioned above provide that when an organ of state in one of the spheres of government or any other institution identified by national legislation contracts for goods or services, it must do so in line with a fair, competitive, equitable system, transparent and cost-effective.<sup>2265</sup> This does not prevent organs of state or institutions from implementing a procurement policy that provides for categories of preference in the allocation of contracts.<sup>2266</sup> Section 217(2)(b) of the *Constitution* further states that nothing prevents institutions or organs of state from implementing a procurement policy that provides for the protection or advancement of persons or categories of persons that have been disadvantaged by unfair discrimination.

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<sup>2261</sup> See para 4.3.8 above. The legislative framework for procurement in South Africa consists of the *Public Finance Management Act* 1 of 1999, the *MFMA*, the *Preferential Procurement Policy Framework Act* 5 of 2000, the *Broad-based Black Economic Empowerment Act* 53 of 2003, and the *Construction Industry Development Board Act* 38 of 2000, amongst others. For more on the legislative framework in this regard, see Ambe and Badenhorst-Weiss 2012 *Journal of Transport and Supply Chain Management* 248 – 249.

<sup>2262</sup> These challenges include, for instance, inadequate planning and the linking of demand to the municipal budget; the lack of skills, capacity and knowledge; inadequate oversight and evaluation of supply chain management; excessive decentralisation in the procurement system; unethical behaviour; lack of effective training of municipal employees in supply chain departments; lack of transparency; and a general failure to comply with procurement policies. See generally Pooe, Mafini and Makhubele 2015 *International Business & Economics Research Journal*; and see Ambe and Badenhorst-Weiss 2012 *Journal of Transport and Supply Chain Management* 249 – 250.

<sup>2263</sup> Bolton 2016 *PELJ* 26; see generally UNOPS *Supplement to the 2013 Annual Statistical Report on United Nations Procurement: Procurement and Innovation*.

<sup>2264</sup> Bolton 2016 *PELJ* 26

<sup>2265</sup> S 217 of the *Constitution*.

<sup>2266</sup> S 217(2)(a) of the *Constitution*.

Bolton<sup>2267</sup> indicates that although it is clear that the promotion of preferential procurement in the country's legislation is of primary importance and that the current utilisation of procurement to address the effect of past Apartheid policies and practices is commendable, the silence in this legislation pertaining to innovation is concerning. It is crucial for procuring entities to be able to use procurement as a tool to drive innovative solutions, given the increasing international demand to link procurement to innovation, and the need to improve the efficiency and quality of service delivery and to address the socio-economic challenges, such as access to water, in South Africa.<sup>2268</sup> The *Preferential Procurement Policy Framework Act*<sup>2269</sup> as well as the *Preferential Procurement Regulations*<sup>2270</sup> are viewed as fairly restrictive, given that while it allows for an organ of state to determine a procurement policy of its own and implement it in accordance with the framework of the latter laws in mind, the organ of state cannot utilise a system that is more generous to historically disadvantaged individuals than that determined in these laws.<sup>2271</sup> On a similar note, Steytler and De Visser observe that the supply chain management policy that must be adopted by municipal councils allows little room for policy choices.<sup>2272</sup> Furthermore, when the procurement of ICTs is concerned, the *State Information Technology Agency Act*,<sup>2273</sup> is also of particular relevance. The latter legislative instrument complicates the procurement of ICT-based innovations due to its regulations that prevent municipalities from awarding ICT procurement tenders as it deems appropriate.<sup>2274</sup>

Furthermore, the Water Research Commission identified several challenges pertaining to the uptake of innovation in the water sector.<sup>2275</sup> For instance, the Commission argues that links between universities and other relevant actors in the water provision sector are not sufficiently established, although South African universities have spearheaded many

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<sup>2267</sup> Bolton 2016 *PELJ* 26.

<sup>2268</sup> Bolton 2016 *PELJ* 26.

<sup>2269</sup> The *Preferential Procurement Policy Framework Act* 5 of 2000.

<sup>2270</sup> GN R32 in GG 40553 of 20 January 2017.

<sup>2271</sup> Bolton 2006 *Journal of Public Procurement* 207.

<sup>2272</sup> Steytler and De Visser *Local Government Law of South Africa* 14 – 17.

<sup>2273</sup> *State Information Technology Agency Act* 88 of 1998.

<sup>2274</sup> Reg 13 in GG 28021 of 23 September 2005.

<sup>2275</sup> The Water Research Commission *The South Africa Water Innovation Story* 33 – 35.

water innovations.<sup>2276</sup> Many innovations that are ready for commercialisation do not make it to the market due to this disconnect between stakeholders.<sup>2277</sup>

## 5.6 Concluding remarks

This chapter investigated intelligent water management technologies as an avenue to aid cities in realising the constitutional water right by addressing specific water service provision challenges. To this extent, the chapter first examined the need expressed in South African policy for the uptake of water technologies and innovations as avenues to address water provision challenges.<sup>2278</sup> From the above analysis, one may conclude that the need to address service delivery issues, such as providing access to sufficient water, with innovative solutions is made very clear. There is a strong emphasis on applying certain technologies to address water provision challenges that could benefit *cities*, explicitly concerning their function as water service providers to communities. In this regard, the development of modern, technology-integrated infrastructure was highlighted as a cornerstone of future cities. Nevertheless, the openness in policy towards technology and innovation as solutions for water service delivery issues may, arguably, be viewed as fruitless if there is no real effort concerning the uptake of water technologies and innovations by cities with the support of, for example, government institutions.

The central aim of the chapter was further addressed by determining the status quo in South Africa concerning intelligent water management technologies and innovation.<sup>2279</sup> It would appear that municipalities still have a long way to go in terms of developing, for instance, the proper capacity to adjust to the growing need for innovative technologies as solutions to water provision challenges. However, government institutions, along with cities, are making a concerted effort to facilitate the uptake of such solutions.<sup>2280</sup>

The chapter took a closer look at some of the technologies the study identified as comprising intelligent water management technologies.<sup>2281</sup> By following the "layered

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<sup>2276</sup> The Water Research Commission *The South Africa Water Innovation Story* 33.

<sup>2277</sup> The Water Research Commission *The South Africa Water Innovation Story* 33.

<sup>2278</sup> See para 5.2 above.

<sup>2279</sup> See para 5.3 above.

<sup>2280</sup> See para 5.3 above.

<sup>2281</sup> See para 5.4.1 above.



approach" and viewing some technologies in isolation or combining them with others, one may conclude that the application of these technologies extends to vastly more challenges than those focused on in this study. In direct terms, as a part of intelligent water management technologies, the technologies and scientific disciplines discussed above have significant room for application in the water provision sector. For instance, smart water infrastructure (such as smart meters and smart pipes) offers valuable opportunities to improve productivity and efficiency within the water sector, which could contribute to the resource's sustainability. These technologies allow for the continuous monitoring of water resources, providing real-time measuring and monitoring, and diagnoses and solutions to complex problems, thus enabling proper maintenance and optimisation of all aspects of the water network.

ICTs, the IoT, data science, and Big Data may also be utilised to tackle significant water service provision issues, especially since accurate data and information management systems are necessary for sound management and decision-making systems in municipalities. ICTs can facilitate shortened response times when problems are reported to the municipality, reduce travel distance and maintenance costs, optimise operations (production costs and energy efficiency, amongst other factors), and improve the overall quality of the service provided by the municipality. Moreover, the IoT and data science could be utilised to facilitate predictive analytics (enabling the use of data, machine learning techniques, and statistical algorithms to identify the estimated likelihood of future outcomes based on current or historical data) and could be utilised to predict when maintenance will be required, which could improve, for instance, outage times and reduce water losses. Big Data, on the other hand, can assist in addressing issues such as process optimisation, stormwater management, aging infrastructure, water quality in the distribution system.

Finally, the chapter applied intelligent water management technologies as a solution to the specific water provision challenges focused on in this study.<sup>2282</sup> Again, these challenges include non-revenue water, illegal water connections, insufficient data, as well as the sustainability of water service provision. By hypothesising on potential and realistic

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<sup>2282</sup> See para 5.4.1 above.

technological solutions for these issues, one may conclude that, in theory, it appears convincing that intelligent water management technologies could be utilised as an avenue to address specific water provision challenges.

To further support the aim of the chapter, it focused on particular cities only, namely the CoJ, the eMM, and the NMBMM, to determine if intelligent water management technologies have been utilised to address water service delivery challenges, and if so, how and to what extent.<sup>2283</sup> This aim was approached via a desktop study solely, and as such, the study relied predominantly on the limited resources available on the relevant cities' websites. Concerning the three cities investigated in this study, the chapter explored the different plans, policies and strategies available that concern the implementation of innovative technologies. As far as was possible, this investigation was narrowed down to seek out the use of intelligent water management technologies. Although this, in principle, limits the findings of the chapter, it was possible to identify either smart or intelligent water technology initiatives, programmes and cases where such technologies were implemented.

Notably, the scope of the findings obtained from the research methodology of this chapter are further limited to the extent that the chapter focused on three cities only, all of which are metropolitan municipalities. Evidently, the results or findings garnered from studying the available literature on these cities' intelligent water management initiatives is in no way reflective of the progress or approaches of all metropolitan municipalities, or all other municipalities in the country for that matter. The findings do, however, illustrate the current awareness, willingness, engagement with and uptake of innovative approaches by cities to address service delivery challenges, and more specifically, the use of intelligent water management technologies to tackle water provision issues.

Findings in relation to the uptake of intelligent water management technologies in the CoJ, the eMM, and the NMBMM include the following: all of the cities investigated had at least either one plan, strategy or policy that directly or indirectly relate to the need to utilise a technology or various technologies to improve the service delivery provided by

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<sup>2283</sup> See para 5.4.2 above.

the city. Next, while some cities, such as the CoJ and the NMBMM have ambitious plans and strategies concerning smart technologies, more research is needed towards establishing the actual implementation or the feasibility of the implementation of the envisioned initiatives. On this note, another finding includes that at least every city utilised one or more intelligent water management technologies to address water service provision challenges.

It was, however, found that cities, at this stage, employ intelligent water management technologies to a very limited extent. As such, there is ample room for developing this innovation as a solution to specific water service delivery challenges. Moreover, from this section, it is possible to extrapolate that the plans, strategies, policies, and programmes that the relevant cities currently have in place are not sufficient on their own to assist cities in addressing water provision issues. Cities should seek to actively *implement* appropriate technological innovations.

In cases where implementation took place, the success thereof varied, and given that the study is desktop-based, the extent of the success or failure of these initiatives could not be determined exactly, but it was found that users of the smart application, developed by the eMM to allow residents to, for instance, obtain their water bills online, seem to report an overall negative experience with the application.<sup>2284</sup> Finally, one may gather that all of these cities consider technology and innovation necessary to overcome water service delivery issues. As such, one may sensibly conclude that, although there may be many potential challenges and stumbling blocks to the uptake thereof,<sup>2285</sup> intelligent water management technologies can reasonably be proposed as an appropriate avenue for South African cities to pursue, in view of realising the constitutional water right.

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<sup>2284</sup> See para 5.4.2.2 above.

<sup>2285</sup> See para 5.5 above.



## CHAPTER 6 CONCLUSION

### 6.1 Rationale, scope and contribution of this study

Water is considered the lifeline of living creatures, and human civilisation in particular. For centuries, access to water has been a critical and defining factor in, for instance, the prosperity and location of cities.<sup>2286</sup> For example, water is necessary for sanitation and drinking, for sustaining health, the environment, as well as the livelihoods of communities.<sup>2287</sup> Therefore, the integral role of access to water in the development of cities cannot be overstated. However, South African cities are met with a host of unique challenges where water service delivery is concerned.<sup>2288</sup> Rapid population growth and urbanisation is directly linked to an increase in water demand, which not only dramatically affects the pressure on existing water infrastructure, but also leads to large volumes of water being extracted from sources that are already dwindling due to the effects of climate change, droughts, and wide-spread pollution.<sup>2289</sup> Moreover, the need to redress the imbalances of the past, the impact of climate change on resource availability, in addition to increasing economic and environmental pressures, invariably adds to the pressure that many cities already experience concerning water service delivery.<sup>2290</sup>

Nevertheless, providing and improving water service delivery is vital to secure the constitutional water right. The country's progress concerning this right is largely dependent on local governments' ability to perform their function to provide water services to communities. Sector-specific laws extensively regulate cities' duties concerning water service delivery, including how much water to provide, to whom to provide it, when to do so, under what circumstances, what to charge for the water

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<sup>2286</sup> Bergkamp, Diphorn, and Trommsdorff "Water and development in the urban setting" 49.

<sup>2287</sup> Bergkamp, Diphorn, and Trommsdorff "Water and development in the urban setting" 49.

<sup>2288</sup> Lewis 2019 <https://thewaterproject.org/water-crisis/water-in-crisis-rural-urban-africa>; The Water Project 2019 <https://thewaterproject.org/water-crisis/water-in-crisis-south-africa>. See also Goonetilleke *et al Sustainable Urban Water Environment: Climate, Pollution and Adaptation* xiv.

<sup>2289</sup> Masindi and Dunker *State of Water and Sanitation in South Africa* 1. Urban expansion caused by population growth undoubtedly transforms local environments, and may inevitably alter local conditions – particularly the rate of contribution of pollutants into bodies of water. Hence, urban expansion may affect the water quality of an area. Due to its various and widespread impact, it is often argued that water environments are the most adversely affected by urbanisation. See Goonetilleke *et al* "Spreading urbanisation and the water environment" 5.

<sup>2290</sup> Swart and Adams "Water services provision and the protection of water resources" 445.

provided, and if the city should charge for the water at all.<sup>2291</sup> The comprehensive nature of the legal framework governing water provision in cities often makes it complex and difficult to navigate. Hence, certain authors describe it as an "intricate legal framework"<sup>2292</sup> with many duties overlapping.<sup>2293</sup>

South Africa's water law adopted a radical approach to address the inequalities resultant from the country's Apartheid legacy.<sup>2294</sup> These legal efforts have not unequivocally solved all of the water service provision-related issues present in cities, since many persons are left without adequate or sufficient access to water nearly 25 years since the constitutional entrenchment of the right to water. While there is no doubt that this is as a result of institutional issues, such as budgetary and capacity constraints, cities are plagued by numerous interrelated issues that impact their ability to provide access to sufficient water to communities.<sup>2295</sup>

As such, while water law has developed over the years to safeguard the provision of water services by cities and consequently the constitutional water right, research remains essential to better comprehend the challenges hampering cities' progress in providing water services to communities, the legal duties associated with these challenges, as well as establishing potential innovative avenues to assist cities in this regard. This study identified the challenges of non-revenue water, illegal water use, insufficient data, and the sustainability of water service provision as under-researched yet complex water service delivery issues. An in-depth investigation into both the nature of these challenges and the relevant legal framework and duties pertaining thereto was essential towards enabling the study to suggest appropriate solutions. The study approached solving these challenges from an innovation point of view, and identified and conceptualised intelligent water management technologies as a potential avenue in this regard. The use of the concept "intelligent water management technologies" is very limited in the literature on the topic, particularly since there is an over-emphasis on *smart* water technologies. However, given the limited scope of application of smart water technologies, this study

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<sup>2291</sup> See chapter 4 above.

<sup>2292</sup> Kidd 2011 *International Journal of Rural Law and Policy* 6.

<sup>2293</sup> See para 2.6 above.

<sup>2294</sup> See paras 1.4, 2.5.1, and chapter 4 above.

<sup>2295</sup> See chapter 3 above.

identified several technologies that it deems to form a part of intelligent water management technologies. These technologies include smart water infrastructure, ICTs, the IoT, data science and Big Data.<sup>2296</sup> Because of the novel combination of these technologies under the umbrella term of intelligent water technologies, extensive research was necessary to determine the exact relevance and potential of these technological components, as well as the appropriateness thereof to address the specific water service delivery challenges at hand.

This study was scoped in several ways. To critically analyse whether cities fulfil duties concerning specific water provision challenges<sup>2297</sup> and to assess if and how cities have embraced intelligent water management technologies,<sup>2298</sup> this study focused on three cities, namely the CoJ, eMM, and the NMBMM, as the subjects of investigation. The study identified and focused only on non-revenue water, illegal water connections, insufficient data, and the sustainability of water service provision as challenges that affect cities' ability to provide sufficient access to water to communities through adequate water provision.<sup>2299</sup> These challenges serve as the foundations of many recommendations that this chapter puts forward, in addition to recommendations concerning the uptake of intelligent water management technologies and the role of innovation in cities.

This study set out to contribute to the current research on the topic by improving the understanding of the right to water by investigating the human right to water from various perspectives, including international, African regional and South African perspectives.<sup>2300</sup> The study analysed each perspective from a legal architecture, judicial interpretation, and scholarly theories point of view.<sup>2301</sup> The latter allowed the study to determine how the right to water developed via several legal instruments, how courts have interpreted the right, and how the right to water is viewed through a scholarly lens.

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<sup>2296</sup> See para 5.4.1 above.

<sup>2297</sup> See para 4.5 above.

<sup>2298</sup> See para 5.4.2 above.

<sup>2299</sup> See chapter 3 above.

<sup>2300</sup> See chapter 2 above.

<sup>2301</sup> See chapter 2 above.

Furthermore, the study identified city-level water service delivery challenges (namely, non-revenue water, illegal water use, insufficient data, and the sustainability of water services)<sup>2302</sup> while also establishing a detailed account of what four specific water provision challenges entail.<sup>2303</sup> Following this, the study conducted an analysis of the legal framework on water service delivery, and determined the legal duties borne by cities concerning the abovementioned water service delivery challenges as well.<sup>2304</sup> The study proceeded to examine intelligent water management technologies as a possible avenue to addressing water provision challenges.<sup>2305</sup> This was done via a desktop-based interrogation and examination of the relevant technological components of intelligent water management technologies, after which the study recommended several ways these technologies could be harnessed to address non-revenue water, illegal water use, insufficient data, and the sustainability of water service provision.<sup>2306</sup>

The research produced in this study critically analyses whether cities could utilise intelligent water management technologies to address specific water provision challenges towards realising the constitutional water right. The novelty of the research lies in its linking of the realisation of the constitutional water right with cities' function as water service providers and identifying four unique city-level challenges as potential obstacles towards the realisation of the constitutional water right. The study establishes an understanding of intelligent water management technologies by identifying the technologies and "layers" that it comprises while proposing it as an innovation that holds potential for addressing the specific water provision challenges analysed in this study.

## **6.2 Research question and objectives**

The primary research question and objective underpinning this study concerns how intelligent water management technologies could aid the realisation of the constitutional water right in South African cities.

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<sup>2302</sup> See para 3.2 above.

<sup>2303</sup> See para 3.3 above.

<sup>2304</sup> See para 4.4 above.

<sup>2305</sup> See chapter 5 above.

<sup>2306</sup> See chapter 5 above.



The above question and objective are based on the hypothesis that cities could utilise intelligent water management technologies to address water service delivery challenges as an avenue to realising the constitutional water right in South Africa.

For this study to address this research question and to test the hypothesis, additional objectives were set:

- To broadly contextualise and analyse the human right to water and its content from an international, African regional, and South African perspective.
- To critically examine water service delivery in South African cities to identify certain challenges impeding municipalities' progress to provide communities with access to sufficient water in fulfilment of the constitutional water right.
- To investigate the rights, duties, and obligations flowing from the national law and policy framework in general, as it pertains to specific water service delivery challenges in South African cities and specific city governments, namely the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality.
- To investigate different intelligent water management technologies and explore how these technologies could aid towards the realisation of the constitutional water right in cities, specifically the City of Johannesburg Metropolitan Municipality, eThekweni Metropolitan Municipality, and Nelson Mandela Bay Metropolitan Municipality.
- To offer concluding remarks and recommendations as to the possibilities offered by intelligent water management technologies to realise the constitutional water right in South African cities.

### **6.3 Structure of the study and research methodology**

As far as it concerns the research method, this study entailed a desktop literature review of primary and secondary legal sources, as well as sources of other disciplines, such as technology, science, and engineering. This methodology allowed the study to extensively

analyse issues such as the different perspectives on the human right to water, the nature of the challenges of non-revenue water, illegal water use, insufficient data and the sustainability of water service provision, in addition to conceptualising and examining intelligent water management technologies. However, certain weaknesses resultant from this methodology were observed. Due to the fact that no empirical research was conducted, it was not possible to comprehensively analyse the actual implementation of water provision related duties. Furthermore, the desktop-based inquiry hampered the study in determining whether certain technological initiatives and innovations by cities have yielded success, to what extent, and whether these initiatives still exist. It was also not possible to establish in detail whether the CoJ, the eMM, and the NMBMM have practically used intelligent water management technologies. Concerning the latter, the researcher had to rely on newspaper articles, and resources available online, such as plans and reports from the websites of the relevant cities.

As far as it concerns the structure of this thesis, the following applies: chapter 2, based on a literature review, analysed the human right to water from an international, African regional and South African perspective. To this end, this chapter determined the development of the right, including how it has been framed and interpreted to date, and what is required for this right to be fulfilled or realised. Based on this literature review, the researcher was able to establish a deeper understanding of the right to water, allowing for a comprehensive investigation into the challenges that cities experience in implementing the water right by way of service delivery and how the South African law has addressed these challenges in chapter 3 and 4.

Chapter 3 identified the water service delivery challenges experienced by South African cities, after which a detailed analysis of certain challenges followed based on a literature review. These challenges include non-revenue water, illegal water use, insufficient data, and the sustainability of water service provision. By examining these challenges in detail, the researcher was able to determine the various components, aspects and factors that each challenge entails, and in doing so, established a comprehensive description of each of the abovementioned complex challenges.

The primary aim of chapter 4 was to comprehensively identify and analyse the national law and policy framework concerning the challenges of non-revenue water, illegal water connections, insufficient data and the sustainability of water service provision. Additionally, the chapter investigated three specific South African cities, namely the CoJ, the eMM, and the NMBMM, with specific reference to their fulfilment of certain water provision-related duties. The latter was done based on a literature review of the primary legal sources relevant to the provision of water services. From this, the researcher was able to make certain assessments concerning the legal framework on water service provision, as well as cities' fulfilment of their water provision-related duties.

Chapter 5 entailed determining the need expressed in law and policy in South Africa for the uptake of innovative approaches towards solving service delivery issues, as well as establishing the status quo in the country concerning the uptake of innovations. The chapter aimed to define and analyse what is meant by intelligent water management technologies. This was done based on a literature review of sources from various disciplines, specifically science, technology and engineering. From this, the researcher was able to determine the components of intelligent water management technologies. Based on similar methodology, the particular intelligent water management technologies were elaborated upon, and the researcher attempted to identify how intelligent water management technologies could be utilised to address the challenges of non-revenue water, illegal water connections, the insufficiency of data, as well as the sustainability of water provision services. Additionally, chapter 5, by way of a literature review of the available sources on the CoJ, the eMM, and the NMBMM's websites, determined whether these cities have utilised intelligent water management technologies, and if so, to what extent. The sources employed in this regard consisted primarily of plans, policies, strategies, news articles and initiatives. Finally, the chapter investigated the potential challenges and problems concerning these technologies' uptake in South African cities by conducting a literature review of mostly secondary sources, specifically scholarly sources. This allowed the researcher to make certain recommendations in the current chapter.

## 6.4 Main findings

In addition to the identification of the four water service delivery challenges discussed in this study, the following findings were made.

### ***6.4.1 Gaps exist between national water service delivery law and city-level implementation***

An analysis of legal instruments that speak to the four specific challenges (non-revenue water, illegal water connections, insufficient data, and the sustainability of water services provision) revealed that *hundreds* of duties exist in this regard.<sup>2307</sup> Through this, it was discovered that, time and again, problems arise when it comes to properly implementing the legislation at hand.<sup>2308</sup> This results in a gap between existing water service provision duties in national law, and the implementation thereof by cities. The latter also alludes to the difficulties currently associated with the level of decentralisation of water service delivery.<sup>2309</sup>

Many reasons for the gaps between the law on water service delivery and its implementation were revealed in this study.<sup>2310</sup> Through analysing the extensive legal framework on water service delivery, reasons such as the overlapping of duties were revealed.<sup>2311</sup> A significant issue is the overburdening of cities due to extensive, resource-intensive and often fragmented water service provision-related legal duties.<sup>2312</sup> To illustrate, some of these duties involve determining and making available tariffs for water services based on the different levels of services provided; ensuring indigent persons have access to a basic water supply; launching suitable programmes for the sampling of the quality of potable water; using, developing, protecting, conserving, controlling, and managing water in a manner that follows the central guiding principles of sustainability, equity as well as efficiency; making bylaws aimed at water service delivery, addressing, for instance, the prevention of unlawful connections or the wasteful use of water;

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<sup>2307</sup> See paras 4.3, 4.3.1 – 4.3.17, 4.4.1 – 4.4.4 above.

<sup>2308</sup> See chapter 4 above.

<sup>2309</sup> See para 4.6 above.

<sup>2310</sup> See para 2.3.3 and chapter 4 above.

<sup>2311</sup> See paras 4.4 and 4.6 above.

<sup>2312</sup> See chapter 4 above.

developing a water services audit containing details for the previous financial year, comparative figures for the preceding two financial years of water conservation and demand management, including at least the total quantity of water unaccounted for; report on the water services they have provided and provide information to national information systems concerning aspects of water service delivery in their area.<sup>2313</sup> These are but some of the duties (of which there are a significant amount given the extensive legal framework) bestowed on cities that relate to their function as water service providers.<sup>2314</sup>

#### ***6.4.2 Cities' adoption of innovations and intelligent water management technologies is challenging***

The legal and technological environment or milieu within which intelligent water management technologies may be implemented in cities is challenging.<sup>2315</sup> As such, it is not (yet) necessarily conducive to the uptake of advanced technologies. The latter finding speaks to the readiness of South African cities for the uptake of intelligent water management technologies.<sup>2316</sup>

For instance, at the national level, while ambitious plans and initiatives are being developed by the Presidential Commission on the Fourth Industrial Revolution,<sup>2317</sup> and its focus on developing human capital and building infrastructure is essential for progress,<sup>2318</sup> it is somewhat exclusionary. It does not comprehensively address or illustrate how development will take place to the inclusion of marginalised and impoverished communities in cities.<sup>2319</sup> While it speaks to empowering youth and women,<sup>2320</sup> it does not allude to disabled persons and those living in extreme poverty, among others.

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<sup>2313</sup> See paras 4.3 – 4.4 above.

<sup>2314</sup> See chapter 4 above.

<sup>2315</sup> See paras 2.5, 3.2, 3.3, 4.3 – 4.6, 5.3 – 5.6 above.

<sup>2316</sup> See paras 5.3 – 5.5 above.

<sup>2317</sup> See paras 5.2 – 5.3 above.

<sup>2318</sup> See GN 591 in GG 43834 of 23 October 2020 35 – 36.

<sup>2319</sup> See generally GN 591 in GG 43834 of 23 October 2020.

<sup>2320</sup> GN 591 in GG 43834 of 23 October 2020 35 – 36.

The above is worrying since, from what was observed from the current legal and technological state of cities in this regard,<sup>2321</sup> it became apparent that minimal effort has been made towards addressing similar issues, including the digital divide. Although cities are making progress towards establishing, for instance, WI-FI access in public areas (which may enable the use of intelligent water management technologies),<sup>2322</sup> marginalised and disadvantaged communities' needs in this regard remain largely unattended to. Instead, there is an apparent potential over-emphasis in the plans, strategies and initiatives of cities to become "smart", and a lack of focus on foundational issues.<sup>2323</sup> The study finds that before attempting to integrate technological innovations that may be inappropriate for a city's current infrastructure or capacity, establishing "enabling environments" is essential. However, it should go beyond mere technological readiness. The latter should include focusing on creating enabling and inclusionary legal developments that are appropriate for South Africa's current and anticipated state of technological development.

In relation to the water sector, specifically, the above is a significant task, given the complexity of the existing legal framework<sup>2324</sup> and the numerous water service delivery challenges in cities.<sup>2325</sup> This is because developing such enabling environments to integrate intelligent water management technologies presents additional complexities, since they are highly dependent on digital technologies.<sup>2326</sup> Technology is always changing, which challenges the often inflexibility of laws and the law-making process. In the city-context, for example, as soon as cities adapt to one very efficient platform or technology, another is available. Therefore, this study finds that if cities fail to plan appropriately and ensure that policies and strategies are agile, they may be unsuccessful at anticipating change ahead of the technology curve. This extends to planning adequately for the infrastructure that will need to be in place for intelligent water

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<sup>2321</sup> See para 5.4.2 above.

<sup>2322</sup> See para 5.4.2 above, specifically, for example, para 5.4.2.1.

<sup>2323</sup> See paras 5.4.2 and 5.6 above.

<sup>2324</sup> See paras 4.2 – 4.4 above.

<sup>2325</sup> See chapter 3 above.

<sup>2326</sup> See para 5.4 above.

management technologies to be a viable avenue in pursuit of addressing specific water service delivery challenges.

The discussion in chapter 5 concerning the potential challenges and stumbling blocks for the uptake of technologies and innovations in cities, along with the overview of the current state of intelligent water management technologies' uptake in cities, significantly contributed to this finding. In addition, this study finds that there are supplementary issues that may be viewed as barriers to entry for intelligent water management technologies in South African cities. Cities often lack funding given their tight budgets and may be reluctant to invest in novel water technologies since these technologies bear the risk of failure.<sup>2327</sup> Moreover, the current absence of proper data laws, policies and guidelines at national level is a significant barrier to entry, which may affect national goals towards gathering and processing data towards optimising decision-making.<sup>2328</sup> Such a deficiency could result in data that may lack integrity and quality, and which may prove practically unusable to effect technological solutions such as predictive analytics.<sup>2329</sup> The latter was illustrated in chapter 3 of this study, during which the deficiencies of the national databases concerning water in the country were investigated.<sup>2330</sup> Furthermore, it is conceded that in some cities, one may perceive a lack of progress towards integrating innovations such as intelligent water management technologies in the planning, policies and strategies of cities.<sup>2331</sup> This may be attributable to, for example, a fear of change and embracing technology and the "unknown", especially when such technologies threaten to replace older systems that persons have come to know, understand and rely on.<sup>2332</sup>

#### ***6.4.3 Technology and innovation are recognised as essential towards improving water service delivery in cities***

This thesis determined that, in recent years, there has been an increase in attention towards utilising innovation and technologies to improve water service delivery in the

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<sup>2327</sup> See paras 3.2 – 3.3 above.

<sup>2328</sup> See paras 3.3.3 and 3.4 above.

<sup>2329</sup> See paras 3.3.3, 3.4 and 4.6 above.

<sup>2330</sup> See paras 3.3.3 and 3.4 above.

<sup>2331</sup> See para 5.4.2 above; SALGA *Smart Cities* 10.

<sup>2332</sup> SALGA *Smart Cities* 10.

country.<sup>2333</sup> Volume 3 of the *Master Plan* predominantly proposes technological innovations as actions necessary towards addressing the many challenges in the country's water sector. While it will be elaborated on below,<sup>2334</sup> to address the complex water provision challenges deliberated in chapter 3, this study puts forward that intelligent water management technologies are a vital avenue to pursue.<sup>2335</sup> For instance, in the case of non-revenue water, although one may generally note that cities must establish appropriate strategies and seek out innovative solutions to reduce non-revenue water, especially leakages, meter malfunctions and meter under-registration, the complexity of the problem warrants advanced, targeted and *innovative* measures.<sup>2336</sup>

Intelligent water management technologies could aid municipalities to take steps to improve their understanding of the non-revenue water in their area by utilising technologies that entail advanced measuring and monitoring systems to detect leaks,<sup>2337</sup> potential meter failure<sup>2338</sup> and unauthorised use, such as illegal water connections.<sup>2339</sup> Furthermore, by employing intelligent water management technologies, cities may have access to (improved) data and information and fully comprehend the magnitude of the issues they face.<sup>2340</sup> This will allow cities to combat underlying water service provision challenges, such as identifying and repairing faulty infrastructure,<sup>2341</sup> improving water services plans and introduce accurate water conservation strategies, measures and management plans.<sup>2342</sup>

In terms of how cities could go about appropriately utilising intelligent water management technologies, this study finds that establishing novel platforms for collaboration and knowledge-sharing, such as the Water Technology and Innovation Forum,<sup>2343</sup> may prove instrumental. Furthermore, an analysis of the relevant policies revealed that *innovation*

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<sup>2333</sup> See para 5.2 above.

<sup>2334</sup> See para 6.5.6 below.

<sup>2335</sup> See chapters 3 and 5 above.

<sup>2336</sup> See paras 3.3.1 and 5.4.1 above.

<sup>2337</sup> See para 3.3.1.1 above.

<sup>2338</sup> See para 3.3.1.2 above.

<sup>2339</sup> See para 3.3.2 above.

<sup>2340</sup> See paras 1.6, 3.3.3, and 5.4.1 above.

<sup>2341</sup> See para 3.3.4 above.

<sup>2342</sup> See paras 3.3.1 and 4.4.1 above.

<sup>2343</sup> See para 5.3 above.



as a concept plays an integral role in cities' ability to utilise technologies to solve problems.<sup>2344</sup> A potential gap in the current status quo of the uptake of innovations in cities is that they lack policies or strategies focusing specifically on innovation, and providing for aspects and guidelines thereto in broad terms. The development of adequate legal instruments by both national and local governments could assist municipalities during, for instance, the "testbed" phase of innovations, as well as provide support in scaling up such innovations.

This study determined that intelligent water management technologies comprise of specific layers that apply to different parts of the water provision cycle.<sup>2345</sup> Based on this, this study finds that a nuanced dissection of these technologies is necessary and valuable during, especially, the planning phase of integrating intelligent water management technologies into water service provision. Additionally, it may allow cities to determine or accurately identify which layers, or which part of the process, a specific technology may apply to.<sup>2346</sup>

As part of the bigger picture, one may reason that the above is vital for many reasons. Potentially, it could aid cities in identifying the exact benefits of such technologies, the costs involved, whether they have the correct enabling infrastructure in place, if the technology is truly appropriate in terms of the capacity or needs of the city, whether the skills of the relevant employees match the operational requirements of the technology, or if it overlaps with the functions of existing infrastructure.<sup>2347</sup> In a broad sense, it allows cities to plan for, manage, maintain and operate such technologies adequately. This could also prove beneficial in the testing phase of such technologies to mitigate the risks posed to the city.<sup>2348</sup>

Central to the finding in this section, is the extent to which cities are currently pursuing intelligent water management technologies as an avenue to address water provision

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<sup>2344</sup> See para 5.2 above.

<sup>2345</sup> See para 5.4.1 above.

<sup>2346</sup> See para 5.4.1 above.

<sup>2347</sup> See para 5.4.1 above.

<sup>2348</sup> See chapter 5 above.

challenges. Currently, it is *very limited*.<sup>2349</sup> This was extrapolated by analysing the initiatives, plans, strategies, and programmes of the CoJ, the eMM, and the NMBMM.<sup>2350</sup> While it may not be true for *all* cities in South Africa, the abovementioned cities constitute three of the country's largest metropolitan areas and may be presented merely as a reflection of the current uptake of such technologies in South African cities. This remark is made with due consideration of the lack of empirical research embarked on in this study. Despite the fact that the CoJ, the eMM, and the NMBMM have several plans, policies, programmes, initiatives and strategies in place that concern utilising technologies to improve water service delivery, it is not deemed sufficient to ensure the eventual use or implementation of such technologies.<sup>2351</sup> The mere existence of these instruments does not safeguard the eventual application of, for instance, intelligent water management technologies. This is evidenced by the fact that the NMBMM proved to have very ambitious plans in place in this regard, but it is, nonetheless, facing very troubling water service delivery challenges, particularly the approach of "Day Zero".<sup>2352</sup>

From the above, one may conclude that a gap exists for the proper implementation of intelligent water management technologies in cities. The study illustrated the many benefits and options that these technologies present to cities,<sup>2353</sup> particularly in relation to addressing the issues of non-revenue water, illegal water connections, insufficient data, and the sustainability of water service provision.<sup>2354</sup> This study finds that utilising intelligent water management technologies as envisioned above is an opportunity for cities to address the challenges they face, to fulfil their water service delivery function, and to contribute to the realisation of the constitutional water right.

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<sup>2349</sup> See para 5.4.2 above.

<sup>2350</sup> See para 5.4.2 above.

<sup>2351</sup> See paras 5.4.2.1 – 5.4.2.3 above.

<sup>2352</sup> See para 4.5.3 above.

<sup>2353</sup> See para 1.6 and chapter 5 above.

<sup>2354</sup> See para 5.4.1 above.

#### **6.4.4 Findings on specific water service delivery challenges**

##### *6.4.4.1 Non-revenue water: national legal duties are sufficient but fragmented*

From the in-depth review of the legal framework relevant to water service delivery, this study finds that the national law sufficiently addresses the challenge of non-revenue water.<sup>2355</sup> Furthermore, the law is aligned with the various components inherent to non-revenue water (namely, physical losses or real losses, commercial or apparent losses, and unbilled authorised consumption).<sup>2356</sup> The national laws, policies, strategies and frameworks provide for exhaustive measures framed as duties to curb non-revenue water.<sup>2357</sup> Thus, the question becomes, why do non-revenue water levels increase or remain high in South African cities, if the law adequately provides for non-revenue water-related duties?

In an attempt to determine whether cities adhere to the many duties outlined in the relevant national laws, the study examined the execution of these legal duties in specific cities, namely the CoJ, the eMM, and the NMBMM.<sup>2358</sup> The study revealed that a critical measure indicated by the legal framework to curb non-revenue water is the development of appropriate water conservation and demand management measures.<sup>2359</sup> As such, chapter 4 of this study examined whether such measures have been included in the cities' water services development plans. While, overall, the CoJ displayed a high level of implementation concerning the conservation and demand management strategies, the eMM indicated very poor implementation.<sup>2360</sup> The NMBMM's levels of implementation varied between average to good.<sup>2361</sup> For instance, out of the 14 measures the City provides for in its water services development plan, at least nine have been put in place.<sup>2362</sup> This revealed that the levels of implementation concerning the legal duties associated with non-revenue water vary amongst cities. This finding is limited in that it

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<sup>2355</sup> See para 4.4.1 above.

<sup>2356</sup> See paras 3.3.1.1 – 3.3.1.3 and 4.4.1 above.

<sup>2357</sup> See para 4.4.1 above.

<sup>2358</sup> See paras 4.5.1 – 4.5.3 above.

<sup>2359</sup> See paras 4.4.1, 4.5.1.2, 4.5.2.2, and 4.5.3.2 above.

<sup>2360</sup> See paras 4.5.1.2 and 4.5.2.2 above.

<sup>2361</sup> The NMBMM *Water Services Development Plan 2015* 35 – 36.

<sup>2362</sup> The NMBMM *Water Services Development Plan 2015* 35 – 36.

was not possible for this study to examine the implementation of all of the legal duties isolated in this regard, especially given the limitations of this study's desktop-based inquiry, and because it would have extensively prolonged the study.

It became clear through the investigation in chapter 4 that while many duties overlap and repeat between legal instruments, particularly insofar as non-revenue water is concerned, it is doubtful whether cities are aware of *all* of these duties, or that they have sufficient capacity to fulfil each of the numerous duties. The *NWRS* reports that many metropolitan and other municipalities have developed and implemented several measures to curb non-revenue water, including pressure management, development of bylaws, removal and retrofitting wasteful devices, sectorisation, improved management, billing, metering, tariff reviews, leak detection and repairs, and the replacement of mains.<sup>2363</sup> Although the Strategy did not formulate the latter measures as duties, it does underscore the need for municipalities to enhance their efforts to reduce non-revenue water, and as such, these measures are highly recommended.<sup>2364</sup>

However, the measures reported by the *NWRS* exemplifies that there is a potentially major misalignment of cities' efforts to address non-revenue water. While the latter may be attributed to the fragmentation of the legal duties in the relevant legal instruments, it can also be construed as an indication of the differences in resource and capacity availability, in addition to, for instance, political will. Furthermore, the study revealed that, often, there is a disconnect between water service provision and revenue collection in cities, which significantly contributes to the determination of water, and revenue losses.<sup>2365</sup>

#### *6.4.4.2 Illegal water use: the law does not provide sufficient measures of elimination*

The current national legal framework recognises the issue of illegal water use and connections. The law makes provision for fines, punishment (including imprisonment) and the disconnection of water connections in cases of illegal water use.<sup>2366</sup> Cities are

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<sup>2363</sup> The *NWRS* 54.

<sup>2364</sup> The *NWRS* 54.

<sup>2365</sup> See para 4.4.1 above.

<sup>2366</sup> See para 4.4.2 above.

enabled by the law, specifically the *Systems Act*, to identify illegal water connections by allowing access to authorised representatives of a municipality or service providers to premises in a municipality to inspect or repair any meter or service connection, or to disconnect, restrict or stop the provision of any service.<sup>2367</sup> However, this study finds that the law on water service provision does not offer sufficient details and measures concerning how cities could eliminate this issue. Instead, the study revealed that the relevant legal instruments mostly provide that where a connection exists, it must be metered and tariffed accordingly.<sup>2368</sup>

The study determined that the *WSA*, the primary legal instrument governing water service delivery in the country, does not make any explicit provision for curbing or eliminating illegal water connections beyond stating that cities should make bylaws in this regard.<sup>2369</sup> There is no clarity on what these bylaws should contain.<sup>2370</sup> Furthermore, the study revealed that the general legal framework does not indicate, for instance, specific measures cities should take to identify illegal connections (such as regular inspections), or how often such measures should be taken. The legal framework also fails to comprehensively define illegal water use, despite the detrimental effect it has on cities' water resources and revenue. While illegal water use is normally categorised as a part of non-revenue water, it is debatable whether it receives sufficient attention as a stand-alone matter and whether the true nature of the issue is understood by cities, including the many forms of illegal water connections and use.

The above is especially troubling, since the *NWRS* recognises that illegal connections to municipal networks and connections to adjacent informal areas are prevalent in many areas.<sup>2371</sup> Additionally, the study revealed that, lacking proper administration, persons who can afford water may abuse free basic water schemes, and illegal water use could become commonplace in this regard.<sup>2372</sup> As such, this study finds that the national law does not reflect the seriousness and the threat that illegal water use poses to the

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<sup>2367</sup> See para 4.4.2 above.

<sup>2368</sup> See para 4.4.2 above.

<sup>2369</sup> See para 4.4.2 above.

<sup>2370</sup> See para 4.4.2 above.

<sup>2371</sup> The *NWRS* 53.

<sup>2372</sup> See para 4.4.2 above.

constitutional water right, since the legal instruments mostly provide for indirect measures to address the issue, but fail to provide explicit guidance to cities concerning the elimination of such water use.

*6.4.4.3 Insufficient data: the legal framework fails to govern cities' collection of data concerning water service delivery*

The above analysis of the legal instruments relevant to the issue of data in the water service provision sector exemplified that, commonly, water services authorities should report *information* on water service delivery related issues, provide this *information* to relevant stakeholders such as the MEC, the Minister or the public, or to make the particular *information* publicly available via, for instance, cities' websites.<sup>2373</sup> While the latter indicates that there is not a complete lack of duties in the legal framework on water service provision concerning the issue of information, it does not mention *how* this information should be collected.<sup>2374</sup> Specifically, this study finds that the relevant legislative instruments completely fail to provide for the collection of *data*.

As mentioned above, information is generated by processing data.<sup>2375</sup> Given the total absence of duties concerning the collection of data concerning the water service delivery functions that cities perform, and the clear need expressed in newer plans and strategies for the (continuous) collection of data in this regard, this study finds that the latter constitutes a major gap in the law. Moreover, it also paints an accurate picture of the legal system's relevance and readiness to adequately govern challenges and opportunities that arise in the era of the Fourth Industrial Revolution.

The implications of this gap in the current law are numerous. Firstly, no guidelines or policies exist that explain the data cycle, exemplifies the role and need for data in cities on water service provision, and most importantly, establishes rules for the collection, storage and processing of data. The latter is made evident through this study's analysis of the NWSKS and the NIWIS.<sup>2376</sup> During the latter analysis it was highlighted that due to

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<sup>2373</sup> See paras 4.4.3 and 4.6 above.

<sup>2374</sup> See paras 4.4.3 above.

<sup>2375</sup> See paras 3.3.3 and 4.4.3 above.

<sup>2376</sup> See paras 3.3.3 and 3.4 above.

the uncertainty and lack of quality and integrity concerning the data used to produce the information for these systems, among other issues, the information on these databases are unusable.<sup>2377</sup> Thus, there are also no measures in place to ensure the quality or integrity of the data collected by cities pertaining to their water provision activities.

As such, this study unveils the need for legislative transformation in this instance. The latter is integral given the significant focus on, and need for, accurate and reliable data for decision-making, planning and performance management in the water provision sector.<sup>2378</sup> Such transformation would also entail developing capacity within cities in order for them to adequately harness the opportunities presented by data for improving on fulfilling their water-related obligations and addressing water provision challenges.

This study determined that the SFWS proves essential towards ensuring the establishment of adequate national information systems.<sup>2379</sup> While the above content from the SFWS does not place many duties on cities to the extent that the collection and use of data is concerned, it does provide valuable and forward-thinking guidelines that would be necessary for cities to properly manage their own information systems.<sup>2380</sup> The SFWS does state that these systems should be compatible and avoid duplication with other monitoring and evaluation systems, such as the NIWIS.<sup>2381</sup> This research study revealed that the principles and guidelines provided for in the SFWS may prove valuable for determining guidelines for, for instance, the NIWIS, taking into account the analysis and shortcomings of NIWIS as previously discussed.<sup>2382</sup> Finally, this study revealed that while the *WSA* allows the Minister to request information from cities concerning their water service delivery actions,<sup>2383</sup> it does not state when or with what frequency the Minister should do this, and also fails to provide specific duties as to the precise information that is required, or how the information (and, thus, the data) should be collected, processed or stored.

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<sup>2377</sup> See para 3.3.3 above.

<sup>2378</sup> See para 3.3.3 above.

<sup>2379</sup> See para 4.4.3 above.

<sup>2380</sup> See para 4.4.3 above.

<sup>2381</sup> The SFWS 61.

<sup>2382</sup> See para 3.3.3 above.

<sup>2383</sup> See para 4.4.3 above.

#### *6.4.4.4 The sustainability of water services: the national legal framework and duties are sufficient*

Based on the examination of the extensive legal framework on water service delivery, this study finds that the current laws and associated legal duties concerning the sustainability of water service delivery are adequate.<sup>2384</sup> The study revealed that water services development plans are an integral tool for water services authorities to develop a realistic and long-term investment plan that prioritises basic water provision, is affordable, sustainable over time and enhances economic development.<sup>2385</sup> However, it is conceded that it is not only up to cities or local government to safeguard sustained water service delivery, seeing as "all spheres of government have a duty, within the limits of physical and financial feasibility"<sup>2386</sup> to work towards this objective.<sup>2387</sup> Finally, one may conclude that sustainable service delivery is not only essential in terms of cities' duty to provide basic water supplies to the community, but it is absolutely necessary within the scope of the constitutional water right,<sup>2388</sup> and broader yet, what is expected in terms of the content of the internationally recognised human right to water.<sup>2389</sup>

### **6.5 Recommendations**

Based on the main findings described above, this section will provide several recommendations. These recommendations may be deemed ambitious, since they reflect the law as it ought to be, and not necessarily as it currently stands. Moreover, the recommendations must be considered in the context of certain ongoing realities that impact their feasibility. In particular, issues such as persistent and extreme poverty, institutional capacity, affordability, political will, and environmental challenges (including climate change and water scarcity) have a bearing on the below recommendations.<sup>2390</sup> The recommendations proffered concerning the use of intelligent water management

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<sup>2384</sup> See para 4.4.4 above.

<sup>2385</sup> See para 4.4.4 above.

<sup>2386</sup> See the Preamble of the *WSA*.

<sup>2387</sup> Thornhill puts forward that the interrelationship among these spheres of government requires attention if service delivery is to be improved; see Thornhill 2011 *African Journal of Public Affairs* 46.

<sup>2388</sup> See para 2.5.1.1 above.

<sup>2389</sup> See para 2.3.1 above.

<sup>2390</sup> See para 3.2 above.



technologies are also made with due regard of, for instance, the unintended consequences of technological interventions (as evidenced by the facts in the *Mazibuko* case).<sup>2391</sup>

### ***6.5.1 Cities should be developed as knowledge hubs***

Cities should assume the role of becoming knowledge hubs to better address water service delivery challenges. Specifically, this could assist cities to bridge the gap between water service delivery law and implementation, and to improve city environments and laws to be more suitable for the uptake of innovations and intelligent water management technologies.<sup>2392</sup> By assuming this role and developing accordingly, cities will be enabled to learn systematically from each other by exchanging and sharing knowledge.<sup>2393</sup> Given the complexity of the legal framework on water service delivery, in addition to the numerous difficult water service delivery challenges faced by cities, developing cities as knowledge hubs may prove instrumental towards accelerating the realisation of the constitutional water right. Additionally, the value and benefit of establishing cities as knowledge hubs, instead of focusing on developing a national knowledge hub, lies in the intricate experiences and ground-level information that cities are able to share, specifically concerning their function as water services providers.

While cities' establishment as knowledge hubs may have many ancillary benefits, this study recommends that cities should prioritise water service provision. A focused approach may enable cities to build support between city-level water policy developers to accelerate legal developments and improve the agility of the relevant law. It also allows cities to systematise solutions, technologies and knowledge available on water service delivery, engage with relevant international stakeholders, establish open dialogues and city twinning arrangements, as well as improve access to funding.<sup>2394</sup>

For cities to become water service provision-oriented knowledge hubs, the uptake of local knowledge, talent and innovations is necessary. Cities should establish open lines of

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<sup>2391</sup> See para 5.1 above.

<sup>2392</sup> Similarly, knowledge networking is suggested by the SFWS; see para 4.4.3 above.

<sup>2393</sup> See generally Penco 2015 *J Knowl Econ*.

<sup>2394</sup> See generally the World Bank Group *The South Africa Knowledge Hub*.

communication with each other, along with platforms to share and store knowledge. Becoming water service provision-oriented knowledge hubs will require of cities to share both successful and unsuccessful experiences, innovations, technologies, solutions, initiatives, learning experiences and programmes, as well as policies and plans, amongst others.

To effectively harness the potential of this recommendation, the law and associated legal developments are vital. To prevent silos and fragmentation, it is suggested that a national legal instrument should be created by the legislature. This instrument should direct cities concerning critical aspects. The latter includes the identification and involvement of stakeholders. To be successful, this knowledge hub should include as many stakeholders as possible, such as members from the community and civil society, the private sector, the government, NGOs, universities and members of academia, as well as international organisations and interested parties. The development of the legal instrument should be directed at establishing knowledge as a resource. The legal instrument should identify guidelines for innovation and collaboration in the water sector, stipulate the different types of knowledge necessary to address water service delivery issues in South Africa, provide for coordination councils, suggest sources of funding, clarify the purpose and extent of city-level knowledge hubs, as well as establish support measures.

#### ***6.5.2 Develop city-level policies and plans specifically aimed at non-revenue water***

Cities should develop policies and plans specifically focused on addressing and reducing non-revenue water. Such policies and plans must comprehensively stipulate cities' national legal duties regarding non-revenue water. These instruments must indicate what is expected of cities to fulfil each non-revenue water-related duty. The latter includes stipulating relevant, clear and concise actions. This recommendation specifically aims to address the fragmentation concerning non-revenue water-related duties provided for in the national legal framework. Furthermore, it could help improve the gaps between the law and its actual implementation, and promote improved levels of implementation.

Furthermore, cities may benefit from including initiatives in policies and plans aimed at educating municipal employees, such as those responsible for revenue collection and

water provision, on the complexity and components of non-revenue water. These initiatives can also serve to raise awareness among municipal staff concerning the many legislative duties and what they entail pertaining to non-revenue water. Such initiatives could contribute to capacity building, and could improve cities' ability to develop and report on actions aimed at curtailing non-revenue water. Finally, these policies and plans could enable the use of innovations such as intelligent water management technologies to solve the challenge of non-revenue water.

### ***6.5.3 Develop national legal instruments aimed at eliminating illegal water use***

The national legislature should develop a legal instrument that stipulates measures, duties and actions to eliminate illegal water use and connections in cities. The instrument should clearly define what is meant by illegal water use and illegal water connections, as well as determine fines and punishment for offences in this regard. This is central towards the ultimate success of cities in adequately addressing this issue, particularly based on the view that illegal water use should be dealt with separately from non-revenue water. The legal instrument should identify the different categories of illegal water use, such as meter reversals, meter bypassing, meter tampering, intercepting water before the metered point, as well as illegal connections and reconnections. It is recommended that the instrument should identify actions that cities can take to identify each of the above kinds of illegal water use, in addition to the procedures necessary to investigate alleged illegal water use. Finally, the legal instrument should determine practical and proactive measures cities can take to eliminate illegal water use, such as mandating regular inspections of water connections, utilising innovative technologies such as intelligent water management technologies to identify potential illegal water use cases, and offering reward measures to persons who inform cities about illegal water use.<sup>2395</sup>

### ***6.5.4 Improve and develop national and city-level laws on data collection, processing and provision measures***

This study recommends that the existing national legal framework pertaining to the provision of water services should be improved and developed to reflect the need for

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<sup>2395</sup> See generally UN Habitat *Reduction of Illegal Water*.

cities to collect *data*. As such, it is recommended that the relevant legislation should draw a distinction between what is meant by data and information. The latter is deemed necessary for these laws to remain relevant, accurate and encourage technological innovation, especially in the age of the Fourth Industrial Revolution. These legal developments are necessary to ensure that outdated views on the collection of information in the water services sector is dealt with. More specifically, the legislature should establish guidelines concerning the collection, processing, storage and the provision of data on water services delivery. For instance, the legislature should define data quality dimensions and data integrity. It is suggested that the law should define the data quality dimensions of accuracy, timeliness, validity, completeness, uniqueness, and consistency, as well as stipulate duties and thresholds in relation thereto. This is essential to improve the usefulness of the current national information systems and databases. By establishing such rules and guidelines, cities can be encouraged to develop plans and strategies in this regard that identify actions and targets to improve their data collection, processing, storage and provision. Ultimately, the latter could aid to improve the information that is provided to national information systems such as the NIWIS and the NWSKS, which could aid to the relevance, usefulness, accuracy, completeness and honesty of information on these databases. The legislature should also provide clarity as to when cities should provide information to national information systems, what kind of information is necessary, with what frequency should cities fulfil this duty. Finally, the legislature should promote the use of national systems of information to measure cities' performance in terms of their reporting duties and data practices.

#### ***6.5.5 Optimise intelligent water management technologies***

Cities should integrate intelligent water management technologies that are appropriate (taking into account various factors such as the specific needs of the city, their skills capacity, and budgetary allowance) to address the challenges of non-revenue water, illegal water connections, insufficient data and the sustainability of water provision services. Notably, chapter 5 discussed the possibilities that intelligent water management technologies hold for addressing the latter challenges by isolating specific technologies and pairing them with others (such as the IoT paired with data science) to seek *innovative*

and cost-effective solutions.<sup>2396</sup> It is not always necessary for cities to take on the entire suite of intelligent water management technologies to effectively and efficiently solve water provision problems.<sup>2397</sup> The latter is the prime reason why a deep and enhanced understanding of intelligent water management coupled with the building of skills, knowledge and capacity is necessary for cities to successfully harness this technological innovation.

As mentioned above, many of the current strategies, plans and policies in place in the CoJ, eMM, and the NMBMM focus on becoming "smart cities".<sup>2398</sup> Several of the actions, solutions or initiatives envisioned in these instruments may, in reality, not be appropriate or even necessary. While it is commendable that cities are willing to embark on ambitious endeavours to become "smart cities", it is recommended that cities should focus on doing more with what they have and optimise their water service delivery function by applying sector-specific technological innovations to facilitate real and practical change. This could entail, for instance, utilising advanced software to manage the maintenance and operation of water infrastructure that may already be in place.<sup>2399</sup> Becoming "smart" should form part of cities' long term developmental goals, and they should focus on achieving this by investing in realistic, practically applicable and appropriate technological solutions to address immediate challenges such as improving water service delivery. Debatably, in the long term, this will contribute to the city becoming smart.

The general caveat to this recommendation that was also flagged earlier in this study, is that an absolute determination of how exactly intelligent water management technologies may be used to address the particular challenges and contribute to the realisation of the constitutional water right would require empirical research. Since this study was desktop-based, it cannot conceivably make *specific* suggestions concerning how, for instance, the CoJ, eMM, or the NMBMM could benefit from these technologies without going about extensive empirical and interdisciplinary research endeavours. This would include, for instance, gathering the specifications of the issue and solution required by the city,

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<sup>2396</sup> See para 5.4.1 above.

<sup>2397</sup> See paras 5.4.1 and 5.5 above.

<sup>2398</sup> See paras 5.4.2.1 – 5.4.2.3, and 6.4.2 above.

<sup>2399</sup> See para 5.4.1 above.

identifying possible intelligent water management technology solutions, implementing these technologies via testbeds and determining how it should be scaled. Therefore, this study merely presents intelligent water management technologies, with its potential and capacity for novel applications, as a possible avenue towards aiding the realisation of the constitutional water right.

Finally, to optimise the uptake of intelligent water management technologies in cities, this study recommends that cities should adopt policies and guidelines regarding the uptake of innovations. Such policies and guidelines should provide clarity as to the innovation life cycle, including what should occur during each stage thereof (i.e., the invention or discovery phase, the development phase, the maturation of the innovation, and the ultimate retention or phasing out of the invention). These guidelines and policies should, *inter alia*, touch on various factors, such as resource allocation, the need for agile supply chain management processes, facilities and infrastructure necessary to enable the uptake of innovations, the need for local and global cooperation, developing the requisite enabling culture, the necessary leadership and management support structures, and the need for competent and aptly skilled staff. Finally, these instruments should, ideally, speak to aspects cities should consider, while determining whether certain technological innovations are appropriate in accordance with their needs and capacity, provide for detailed guidelines concerning integral steps in successfully implementing innovations, such as testbeds and the scaling up of technologies.

## **6.6 Future research**

Throughout the course of this study, it became evident that there are some issues that could benefit from legal further research. These issues are briefly listed as questions below.

- 1) How does South Africa's legal framework on water service delivery and the constitutional water right compare with that of other countries, globally and in Africa? What can be learned from these countries?
- 2) Is the current level of decentralisation in the legal framework on water service delivery conducive to adequate water provision to communities?

- 3) To what extent are cities fulfilling their obligation to report on the water services they provide? How can reporting mechanisms be improved? Should oversight by the Auditor-General be improved?
- 4) What would a national data law or policy that governs the capturing, management and processing of data into information look like in the South African context?
- 5) How could the current law on water service provision be developed to act as a catalyst for the uptake of intelligent water management technologies in cities?
- 6) What should the main considerations be for the development of policies and guidelines pertaining to the uptake of innovations in cities?
- 7) What kind of digital infrastructure is essential to create an enabling environment in cities? What would a regulatory framework look like in this regard?
- 8) To what extent can the national and provincial spheres of government aid cities in building their internal capacity to enable cities to utilise innovative solutions such as intelligent water management technologies? How should they go about this?
- 9) Based on empirical and interdisciplinary research entailing comparable pilot studies of the abovementioned intelligent water management technologies, how, if at all, could South African cities benefit from the use of these technologies to address water service delivery challenges?

## **6.7 Conclusion**

This study was undertaken based on the understanding that cities are pivotal to the fulfilment of the human right to water and the realisation of the South African constitutional right. It was illustrated in this study that intelligent water management technologies have the technical and innovative capacity cities require to address the challenges of non-revenue water, illegal water use, insufficient data, and the sustainability of water services, as an avenue to realise the constitutional water right. However, it remains up to cities whether they choose to adequately utilise this option.

To fully benefit from intelligent water management technologies, cities must establish enabling environments both in terms of the law and foundational technologies. Beyond recommending intelligent water management technologies as a potentially vital opportunity for cities to harness towards fulfilling the constitutional right by improving their water service delivery performance, it is recognised that the law and legal developments remain key to solve water service delivery challenges. However, going forward, the law will have to become agile and cognisant of the present reality, challenges and opportunities presented by the Fourth Industrial Revolution.



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