

# Legal protection of 'microclimate regulation' as an urban ecosystem service in South Africa

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**All viewpoints and errors remain the student's own.**

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## **ABSTRACT**

The current trends towards living in urban areas, along with unabated urban development are critically affecting cities and city environments. Urban areas face severe challenges such as environmental degradation, over-exploitation of natural resources, pollution, and changes in city climates. These challenges constrain the capacity of ecosystems to provide crucial services upon which all humanity depend for their health, well-being, and livelihoods.

South Africa has an extensive environmental, local government and planning legal framework that aims to realise the environmental right set out in section 24 of the *Constitution of the Republic of South Africa*, 1996. The realisation of this right is the shared responsibility of every sphere of government. Based on the above environmental context, local government has an increasingly important role to play.

Urban ecosystems deliver ecosystem services which benefit city residents. Ecosystem services are categorised into provisioning, supporting, cultural and regulating services. The function of regulating services is to attempt to balance the environment in which other processes or functions occur and can consist of ecosystem services such as water purification, air quality maintenance, and microclimate regulation. The focus in this study is on microclimate regulation which entails the regulation of temperature, humidity and precipitation within cities. The regulation capabilities of microclimate regulation provide a particularly valuable service when considering heat island effects in cities and the global climate change crisis.

Against this backdrop, this study explores what the options are in law for the protection of microclimate regulation as an urban ecosystem service in South Africa.

**Key words:** Ecosystem services; environmental law; local government law; microclimate regulation; cities; South Africa

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## LIST OF ABBREVIATIONS

°C	Degrees Celsius
Afr J Int'l & Comp L	African Journal of International and Comparative Law
AgriSA	South African Agriculture Union
AMBIO	A Journal of the Human Environment
Building Serv Eng Res Technol	Building Services Engineering Research and Technology
Bull World Health Organ	Bulletin of the World Health Organization
CBD	Central Business District
CC	Constitutional Court
CH <sub>4</sub>	Methane
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CPA	Criminal Procedure Act 51 of 1977
CSIR	Council for Scientific and Industrial Research
CTA	Carbon Tax Act 15 of 2019
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DMA	Disaster Management Act 57 of 2002
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMCA	Environmental Management Co-operation Agreement
EMF	Environmental Management Framework
EMI	Environmental Management Inspector

EMPr	Environmental Management Programme
EMS	Environmental Management System
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
Gen Not	General Notice
GG	Government Gazette
GHG	Greenhouse gases
GN	Government Notice
ICLEI	International Council for Environmental Initiatives
IDP	Integrated Development Plan
iForest	Biogeosciences and Forestry
Int. J. Climatol	International Journal of Climatology
IRP	Integrated Resource Plan
ISO	International Organisation for Standardisation
IUCN	International Union for Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change
J. Appl. Sci. Environ. Manage.	Journal of Applied Sciences and Environmental Management
LEG	Local Environmental Governance
MBI	Market-based instrument
MEA	Millennium Ecosystem Assessment
MEC	Member of the Executive Council
MFMA	Local Government: Municipal Finance Management Act 56 of 2003

MSA	Local Government: Municipal Systems Act 32 of 2000
N <sub>2</sub> O	Nitrous Oxide
NBA	National Biodiversity Assessment
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act 107 of 1998
NEMAQA	National Environmental Management Air Quality Act 39 of 2004
NEMBA	National Environmental Management Biodiversity Act 10 of 2004
NEMICMA	National Environmental Management Integrated Coastal Management Act 24 of 2008
NEMPAA	National Environmental Management Protected Areas Act 57 of 2003
NEMWA	National Environmental Management Waste Act 59 of 2008
NGO	Non-governmental organisation
NRF	National Research Foundation
NWA	National Water Act 36 of 1998
NWRS	National Water Resource Strategy
NWU	North-West University
OECD	Organisation for Economic Co-operation and Development
PAIA	Promotion to Access to Information Act 2 of 2000
PAJA	Promotion of Administrative Justice Act 3 of 2000
PELJ	Potchefstroom Electronic Law Journal

PG	Provincial Gazette
Phil Trans R Soc A	Philosophic Transactions of the Royal Society
PM	Particulate Matter
PMS	Performance Management System
PN	Provincial Notice
PPP	Public-private partnership
SACN	South African Cities Network
SAJCJ	South African Journal of Criminal Justice
SAJELP	South African Journal of Environmental Law and Policy
SAJHR	South African Journal of Human Rights
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAPL	Southern African Public Law
SARS	South African Revenue Service
SCA	Supreme Court of Appeal
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SEMA	Specific Environmental Management Act
SO <sub>2</sub>	Sulphur Dioxide
SOER	State of the Environment Report
SPLUMA	Spatial Planning and Land Use Management Act 16 of 2013
Stell LR	Stellenbosch Law Review
SWSA	Strategic Water Source Area

TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UN-DESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
WCED	World Commission on Environment and Development
Wetlands Ecol Manage	Wetlands Ecology and Management
WSA	Water Services Act 108 of 1997
WSSA	Water and Sanitation Services South Africa

## Chapter 1 Introduction

### 1.1 Background

Urbanisation has become one of the most prevalent global trends in the last few decades, and urban areas are currently home to the majority of the earth's population.<sup>1</sup> Urban areas have large and lasting anthropogenic effects as human activities are more highly concentrated in these areas.<sup>2</sup> Rapid urbanisation triggers a range of challenges for cities,<sup>3</sup> not only in terms of limited space, inequality, or the lack of access to essential services, but it is also progressively putting immense pressure on the environment.<sup>4</sup> The pressure on ecosystems can be directly attributed to the influence of human activities on the environment.<sup>5</sup> Cities, as hubs

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- <sup>1</sup> Projections show that more than half of the earth's people live in urban areas and the number of people in cities will likely increase in the coming years - Ritchie and Roser *Urbanization* 1; Wu 2010 *Landscape Ecology* 1; United Nations Department of Economic and Social Affairs, Population Division *World Urbanization Prospects: The 2014 Revision*; UN-DESA 2018 <https://bit.ly/3boy7dO>; Brown *Eco-economy: Building an Economy for the Earth* 187.
  - <sup>2</sup> Seto, Parnell and Elmqvist "A Global outlook on Urbanization" 7; Gómez-Baggethun *et al* "Urban Ecosystem Services" 176. The term "urban" in the context of this study denotes a town, city or metropolitan and may also be considered to mean an "urban area" consisting of built-up infrastructure and big and densely populated areas – Stevenson and Waite *Concise Oxford English Dictionary* 1592. See also para 2.3.1 below.
  - <sup>3</sup> The city (or cities), as used in this study, refers to a large urban agglomeration, metropolitan or city region that excludes rural land and is based on geographical boundaries. They can also be referred to as primary cities as they contain the biggest portion of the country's population, job opportunities, national resources, and goods and services. See Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 30-32.
  - <sup>4</sup> Wu 2008 *Landscape Journal* 41. Several authors further maintain that urbanisation is one of the major causes of environmental problems such as climate change, biodiversity loss and ecosystem degradation – see Du Toit and Cilliers "Urban Ecology" 753; McNeill *Something New Under the Sun: An Environmental History of the Twentieth-century World* 281-287; Brown *Eco-economy: Building an Economy for the Earth* 36; Grimm *et al* 2000 *BioScience* 572; Bloom, Canning and Fink 2008 *Science* 772.
  - <sup>5</sup> This phenomenon, the Anthropocene, is characterised by the human domination, and modification of the biosphere which causes earth systems to reach a critically unstable state. In the context of this study, the notion "urban Anthropocene" denotes the dominance of humans in the current geological age where a majority of humans are concentrated in urban spaces of interrelated "socio-economic, spatial, institutional, and ecological dynamics" where humans seemingly navigate the urban space in which they live to create and sustain their livelihoods and go about with urban practices in the space where they live or work - see Crutzen 2002 *Nature* 23; Crutzen "The Anthropocene" 13; Zalasiewicz *et al* 2010 *Environmental Science & Technology* 2228; Steffen *et al* 2011 *AMBIO* 739 and 741; Kotzé 2014 *Journal of Energy & Natural Resources Law* 121, 131-132; Lubbe and Kotzé 2019 *Afr J Int'l & Comp L* 77; Allen, Lampis and Swilling *Untamed Urbanisms* 4-9; Barthel, Sörlin and Ljungkvist "Innovative Memory and Resilient Cities: Echoes from Ancient Constantinople" 392; Hillel and Puppim de Oliveira 2014 <https://bit.ly/2xZHjaQ>; Trachtenberg 2017 <https://bit.ly/3dF64YU>.

of human activity, are considered to be a fundamental characteristic of the Anthropocene as they represent the most prominent evidence of human influence and the impact they have.<sup>6</sup>

The increase in human activities threatens the environment's integrity and capacity to provide urban ecosystem services,<sup>7</sup> especially in developing countries.<sup>8</sup> Urban ecosystem services, in this context, refers to ecosystem services that are naturally generated in urban landscapes.<sup>9</sup> Some developing countries,<sup>10</sup> such as South Africa,<sup>11</sup> house large amounts of biodiversity and are dependent on natural resources for economic development.<sup>12</sup> Subsequently, these countries are at risk of being deprived of a substantial amount of natural resources due to environmental problems, such as biodiversity loss, over-exploitation and ecosystem degradation.<sup>13</sup> The protection of biodiversity and ecosystems are necessary to maintain the integrity of the ecological systems on which life depends, even in cities.<sup>14</sup> It is necessary to consider the dynamics of urban ecology,<sup>15</sup> which pertains to the interactions between the natural environment and human activities in urban areas to determine the extent of the required protection.<sup>16</sup> These interactions are

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<sup>6</sup> Zalasiewicz *et al* 2011 *Phil Trans R Soc A* 836; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 25.

<sup>7</sup> Melillo and Sala "Ecosystem Services" 111; Alberti 2010 *Current Opinion in Environmental Sustainability* 178; McPhearson *et al* 2016 *BioScience* 199; Brown *Eco-economy: Building an Economy for the Earth* 190; Irwin and Ranganathan "Action Agenda for Sustaining Ecosystem Services" 21; Salau 2016 *International Journal of Architecture and Urban Development* 6.

<sup>8</sup> See Voigtländer, Breckenkamp and Razum 2008 *Journal of Health and Development* 140-141; Mérorès "Reaffirming Development Priorities: Uniting to Combat Obstacles to Progress" 14; Cohen 2006 *Technology in Society* 64.

<sup>9</sup> See further para 2.3.2 below.

<sup>10</sup> Developing countries, especially those in the "Global South" including regions such as Asia, Africa and Latin America are said to contain majority of the world's biodiversity – see The World Bank 2012 <https://bit.ly/2Lkmlg>. See also UN Environment 2018 <https://bit.ly/2LjgK3s>.

<sup>11</sup> South Africa was ranked "the third most biologically diverse country in the world" – South African National Biodiversity Institute 2018 <https://bit.ly/35UIkNU> (hereafter SANBI). See also Department of Environmental Affairs 2014 <https://bit.ly/2zB0ZSA>.

<sup>12</sup> See para 1.2.1 of Gen Not 1095 in GG 18163 of 28 July 1997 (*White Paper on the Conservation and Use of South Africa's Biodiversity*, 1997) (hereafter the Biodiversity White Paper).

<sup>13</sup> Para 1.2.2 the Biodiversity White Paper.

<sup>14</sup> SACN *State of South African Cities Report 2016* 189; The Nature Conservancy *Nature in the Urban Century* 53; Harte 2001 *Ecology Law Quarterly* 930-931, 934; Deutsch, Dyball and Steffen "Feeding Cities" 507; Karr 1993 *Yale Journal of International Law* 298. See also para 1.2.2 of the Biodiversity White Paper.

<sup>15</sup> See para 2.2 below.

<sup>16</sup> Swan *et al* 2012 *Urban Ecology* 179-186.

indicative of the fact that issues of population growth and urban development, food and water security, energy (also known as the water-energy-food (WEF)-nexus), as well as resource depletion and the environment, are inextricably linked. In other words, they "cannot be treated in isolation."<sup>17</sup> Understanding how these interactions work is necessary to determine if and how local governments can manage these interactions and evaluate the options available in law to protect ecosystems and the services they provide.<sup>18</sup> In the context of this study, the discussion focuses on urban areas and the local governments (municipalities) that govern in such urban areas;<sup>19</sup> while (the admittedly relevant) rural hinterland areas<sup>20</sup> fall outside the scope of this study.

Ecosystems consist of both organisms and physical factors.<sup>21</sup> Ecosystems are considered to be dynamic systems.<sup>22</sup> The steady state of these systems can be disturbed through natural processes or human activities.<sup>23</sup> The disturbances of ecosystems can alter the environment and activities of organisms in the particular

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<sup>17</sup> Simpson and Jewitt 2019 *Frontiers in Environmental Science* 3; *World Commission on Environment and Development (WCED): Our Common Future* UN Doc A/RES/38/161 (1987) para 40 (hereafter the Brundtland report).

<sup>18</sup> Du Toit and Cilliers "Urban Ecology" 756; Shochat *et al* 2006 *Trends in Ecology and Evolution* 186; McPhearson *et al* 2016 *BioScience* 154-155.

<sup>19</sup> The words "local government", "municipality" and "city/local authority" will be used interchangeably and in the context of this study, only refer to the local governments in urban areas, despite many local governments governing rural areas. Municipalities are divided into three distinct categories in the *Constitution of the Republic of South Africa*, 1996 (hereafter the Constitution) and the *Local Government: Municipal Structures Act* 117 of 1998 (hereafter *Municipal Structures Act*) "based on the scale of urban development in such area, socio-economic and political factors and the contribution of an area to the national economy". See s 155(1) of the Constitution; s 1 of the *Municipal Structures Act*; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 36. See also para 4.2 below.

<sup>20</sup> Rural areas comprise lower population density, more undeveloped land, and are usually remote from and smaller than urban areas – see Food and Agriculture Organization of the United Nations (FAO) *Guidelines on Defining Rural Areas and Compiling Indicators for Development Policy* 10.

<sup>21</sup> Tansley 1935 *Ecology* 299; Paterson "Biological Diversity" 521. See also Chapin, Matson and Mooney *Principles of Terrestrial Ecosystem Ecology* 8.

<sup>22</sup> Jørgensen, Patten and Straškraba 1999 *Ecological Modelling* 42; Ulgiati and Brown "Emergy Accounting of Human-Dominated Large-Scale Ecosystems" 63; Bear *et al* *Principles of Biology* 42; Anon date unknown <https://bit.ly/2WpfdkQ>; Turner *et al* "Conceptual Framework" 21.

<sup>23</sup> Reiners "Disturbance and Basic Properties of Ecosystem Energetics" 83; Pickett *et al* 1997 *Urban Ecosystems* 188; Bear *et al* *Principles of Biology* 42.

ecosystem (for example, by causing erosion and/or changes in temperature, etc.).<sup>24</sup> Urban ecosystems, through their natural processes and functions, produce a range of different services to the benefit and detriment of their human inhabitants.<sup>25</sup> This tension is discussed in more detail in chapter two.<sup>26</sup>

The Millennium Ecosystem Assessment (MEA) defines ecosystem services as the "benefits people obtain from ecosystems".<sup>27</sup> Ecosystem services can typically improve the livelihoods of people, the resilience of a city, and the health and well-being of a community. They also contribute to making a community feel more secure.<sup>28</sup> Ecosystem services are classified as provisioning, cultural, supporting, or regulating services.<sup>29</sup> This classification follows the function served or type of ecosystem service delivered.<sup>30</sup> For purposes of this study, the focus is on the so-called "regulating ecosystem services", specifically microclimate regulation and the legal protection thereof in urban areas. The other three ecosystem services are explained briefly in chapter two.<sup>31</sup>

Regulating services provide for the regulation or maintenance of certain natural processes in ecosystems. It also provides benefits to people in cities.<sup>32</sup> These services are important for the continuation and existence of ecosystems and the environment. The reason being that they regulate and attempt to balance the environment in which processes or functions such as food production, clean water

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<sup>24</sup> Els *Urban Ecosystem Services in Johannesburg, South Africa* 12. These new ecosystems are referred to as urban ecosystems. See Chapin, Matson and Mooney *Principles of Terrestrial Ecosystem Ecology* 14-16.

<sup>25</sup> The Economics of Ecosystems and Biodiversity (TEEB) 2011 <https://bit.ly/3bsHxoo>; Lyytimäki *et al* 2008 *Environmental Sciences* 164; see also Ernstson and Sörlin 2012 *Ecological Economics* 5.

<sup>26</sup> See para 2.3.2 below.

<sup>27</sup> Millennium Ecosystem Assessment (MEA) *Ecosystems and Human Well-being: Synthesis v*; MEA 2005 <https://bit.ly/2LmsNgf>. See also paragraph 2.3.2 below for further elaboration on ecosystem services.

<sup>28</sup> Wittmer *et al* 2013 *The Economics of Ecosystems and Biodiversity* 15. See further para 2.3.2 below.

<sup>29</sup> MEA *Ecosystems and Human Well-being: Synthesis v*.

<sup>30</sup> TEEB date unknown <https://bit.ly/3dHbHFU>; MEA *Ecosystems and Human Well-being: Synthesis v*.

<sup>31</sup> See para 2.3.3 below.

<sup>32</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 57; Slootweg "Interpretation of Biodiversity" 37.

provision, waste treatment, soil formation and retention, habitat formation, pollination and nutrient cycling occur.<sup>33</sup>

Microclimate regulation is a particularly important regulatory ecosystem service in light of the global climate change crisis that is responsible for significant ecosystem degradation.<sup>34</sup> Microclimate regulation occurs when objects in the environment, such as streets, trees, wetlands, buildings, etc. influence the microclimatic conditions of its surrounding area.<sup>35</sup> Microclimate regulation in cities entails the regulation of the local temperature, humidity and precipitation.<sup>36</sup>

A few adaptation methods have been suggested for the protection of microclimate regulation as an urban ecosystem service.<sup>37</sup> However, most of these might not be suitable for the South African context as it is an arid country experiencing severe droughts in several regions.<sup>38</sup> Therefore, in terms of their joint mandate with national and provincial government regarding environmental protection,<sup>39</sup> local governments need to be innovative in their approach to microclimate regulation. They may typically have to adopt legislative and other protective measures that are suited for local circumstances.

The protection of ecosystem services requires human intervention. In attempting to address the protection of microclimate regulation ecosystem services in South African cities by using the law, a key question that need to be answered is: what options are available to government,<sup>40</sup> and especially municipalities in urban areas, to realise such protection? The functions of the different spheres of government are stipulated in a combination of the Constitution, the framework and sectoral-specific legislation. The Constitution provides that the three spheres of government, namely

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<sup>33</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 57-58.

<sup>34</sup> Munang *et al* 2013 *Current Opinion in Environmental Sustainability* 1.

<sup>35</sup> Wang *et al* 2018 *iForest* 140-147; Zhang, Zhu and Jiang 2016 *Sustainability* 1; Dimoudi *et al* 2013 *Energy and Buildings* 1-9.

<sup>36</sup> Smith *et al* 2013 *Journal of Applied Ecology* 813. See further para 2.4 below in this regard.

<sup>37</sup> Toparlar 2018 *Int J Climatol* 303.

<sup>38</sup> Department of Water Affairs date unknown <http://www.dwa.gov.za/drought/>.

<sup>39</sup> See also para 4.2 below.

<sup>40</sup> Options in law, in the context of this study refer to instruments and measures available in the South African legal framework that may be utilised by municipalities to address and realise the protection of microclimate regulation services. See paras 3 and 4 below.

national, provincial and local government must operate as "distinctive, interdependent and interrelated" with and from each other through co-operative governance.<sup>41</sup> The Constitution, further outlines the various legislative and other functions and competencies for the different spheres of government, with the environment particularly being assigned as a concurrent function of the national and provincial spheres.<sup>42</sup> There are several legislative functions assigned to municipalities in part B of schedules 4 and 5 of the Constitution to which the protection of the environment or conservation thereof might be considered 'incidental'.<sup>43</sup> With regards to the environment, section 24 of the Constitution provides that:

Everyone has the right—

- (a) to an environment that is not harmful to their health or well-being; and
- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—
  - (i) prevent pollution and ecological degradation;
  - (ii) promote conservation; and
  - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.<sup>44</sup>

From the above statement, it is evident that the state's protection of the environment is a constitutional imperative.<sup>45</sup> It is further apparent that all spheres are collectively responsible for the protection of the environment as well as a safe and healthy environment.<sup>46</sup> The constitutional environmental right also extends to ecosystems and the variety of ecosystem services they offer that contribute to human health and well-being.<sup>47</sup>

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<sup>41</sup> Section 40(1) of the Constitution.

<sup>42</sup> Schedules 4 and 5 of the Constitution.

<sup>43</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 167.

<sup>44</sup> Section 24 of the Constitution.

<sup>45</sup> Humby 2016 *SAJHR* 221,232,243; Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 340, 343, 358, 432; Du Plessis 2010 *Stell LR* 266,268; Du Plessis 2015 *PELJ* 1866; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 185; Kotzé "Environmental Governance" 121-123; *HTF Developers v Minister of Environmental Affairs and Tourism* 2006 5 SA 512 (T) para 6.

<sup>46</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 200; Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 11-12; 352-353; 358; Du Plessis and Kotzé 2014 *Journal of African Law* 154-155.

<sup>47</sup> Muir *An interpretation of the South African Constitutional 'Environmental Right' (Section 24 of the Constitution of the Republic of South Africa, 1996) and an Assessment of its relationship to Sustainable Development* 72, 80; Blanco and Razaque 2009 *Human Rights Quarterly* 703.

Water is an example of a natural resource that needs protection as it contributes to human well-being and it is a basic human need. Together with the right to an "environment not detrimental to human health and well-being", the Constitution provides for the right of "access to sufficient food and water"<sup>48</sup> and holds that "reasonable legislative and other measures" must be used to realise this right.<sup>49</sup> South Africa is facing severe water resource challenges that can, in part, be alleviated by the provision of ecosystem services.<sup>50</sup> Consequently, water resources providing these services must also be protected.<sup>51</sup> Water resources also play an integral role in microclimate regulation, as discussed in chapter two.<sup>52</sup>

When sections 24 and 27 are read in conjunction with section 7(2) of the Constitution, there is a clear obligation on the state (including local government) to "respect, protect, promote and fulfil" these rights.<sup>53</sup> In addition to these constitutional rights, the "reasonable and other legislative measures" referred to in sections 24 and 27 of the Constitution include environmental framework legislation, as well as sectoral-specific legislation for protection of the environment.<sup>54</sup> Environmental legislation such as the NEMA, the *National Water Act*,<sup>55</sup> the *National Environmental Management: Biodiversity Act*,<sup>56</sup> and the *National Environmental Management: Protected Areas Act*<sup>57</sup> are examples of legislative measures taken. Municipalities can also adopt local environmental governance instrumentation such as command-and-control instruments, planning instruments, by-laws, local policies, etc. to fulfil the mandates placed on them by the Constitution and other

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<sup>48</sup> Section 27(1)(b) of the Constitution. The Constitution mandates local government to provide water and sanitation services – see schedule 4B of the Constitution.

<sup>49</sup> Section 27(2) of the Constitution.

<sup>50</sup> These ecosystem services include provision of water, water purification processes and microclimate regulation through water resources – see South African National Biodiversity Institute (SANBI) 2020 <https://bit.ly/3aqXeQp>. See also para 2.4 below.

<sup>51</sup> Swart and Adams "Water services provision and the protection of water resources" 445.

<sup>52</sup> See para 2.4 below.

<sup>53</sup> See further paras 3.1 and 4.2 below.

<sup>54</sup> Nel and Du Plessis 2001 *SAJELP* 19.

<sup>55</sup> *National Water Act* 36 of 1998 (hereafter NWA).

<sup>56</sup> *National Environmental Management: Biodiversity Act* 10 of 2004 (hereafter NEMBA).

<sup>57</sup> *National Environmental Management: Protected Areas Act* 57 of 2003 (hereafter NEMPAA).

environmental and local government legislation.<sup>58</sup> These instruments may potentially assist local governments in regulating activities relevant to ecosystem services and conservation of the environment.

This study is premised on the understanding that local governments are required by law to promote and protect the environment within the constraints of their legislative and executive authority. For example, this includes responsibilities in terms of ecosystem protection through the incorporation of legislative measures. This protection also extends to the protection of microclimate regulation as a part of the basket of ecosystem services delivered in the city space.

### **1.2 Research Question**

What are the options in South African law for the protection of "microclimate regulation" as an urban ecosystem service?

### **1.3 Objectives**

The primary objective of this study is to determine the available options in the law for the protection of "microclimate regulation" as an urban ecosystem service in South Africa.

Additional objectives include, to:

- provide a sound theoretical understanding of the notions of the urban ecosystem and ecosystem services;
- based on the above definitions, establish the value offered by urban ecosystems and urban ecosystem services for human benefit;
- determine what microclimate regulation entails as an ecosystem service in the South African context, in light of the classification of ecosystem services;

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<sup>58</sup> Nel, Du Plessis and Retief "Key elements for municipal action" 44-48; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 101-143; *Local Government: Municipal Systems Act* 32 of 2000 (hereafter MSA). See also paras 3 and 4 below.

- identify and critically evaluate the existing instruments in the South African legal framework, inclusive of the environmental, planning and local government law and policies that enable and hinder the protection of microclimate regulation as an ecosystem service; and
- determine and critically discuss specific municipal governance instrumentation available in South African law and determine whether these instruments enable or hinder the protection of microclimate regulation as an urban ecosystem service.

#### ***1.4 Hypothesis and Assumptions***

This study is premised on the following hypothesis:

- Local government can contribute to the protection of "microclimate regulation" as an urban ecosystem service, by using existing options in South African law through exercising its legislative and executive authority.

The study is based on the following assumptions:

- Ecosystem services and microclimate regulation form part of the environment and local environmental governance.
- Ecosystems are multifunctional and can provide several valuable services at the same time.
- Urbanisation and human activities have a detrimental impact on the environment and especially ecosystems.
- In terms of the Constitution, local government framework legislation, environmental framework and sectoral legislation, and spatial planning laws, local governments have the responsibility to protect the environment, inclusive of ecosystem services and microclimate regulation, within the constraints of their legislative and executive authority.

### ***1.5 Research Methodology***

To understand and contextualise ecosystems, ecosystem services and microclimate regulation, this study is informed by sources from other disciplines, such as environmental sciences, ecology, urban ecology, and biology. The use of sources from different scientific domains is necessary for this legal study because the ideas of urban ecology and urban ecosystems are situated in the scholarly fields of biology and ecology.

In addition to the above, this study is founded in law. As such, the study includes literature reviews of both primary and secondary sources of law. Primary sources such as legislation and regulations from the national, provincial, and local government spheres were consulted, as well as case-law relating to the fields of environmental law, planning law and local government law. Secondary sources such as books, journals, articles, reports, and internet sources were used. These sources all deal with urban ecosystems, ecosystem services (predominantly regulation ecosystem services and microclimate regulation), the role and competencies of municipalities in the conservation of the environment, and the protection of microclimate regulation as an ecosystem service in South Africa. The scope of the discussion is limited to the South African law.

This study focuses in its analysis on microclimate regulation as a particular type of ecosystem service. It is however possible for some of the findings and recommendations to also find application to other types of ecosystem services. The intention is not, however, to extrapolate the findings of the present study.

### ***1.6 Framework***

Chapter two lays the theoretical and conceptual basis of the study. This chapter defines the concepts "urban ecosystem services" and "microclimate regulation". Furthermore, it analyses the perceived value of urban ecosystems and urban ecosystem services with specific reference to microclimate regulation services in cities.

Chapter three explores the existing South African legal framework and identifies a range of instruments that enable and hinder the protection of microclimate regulation as an ecosystem service. This chapter also looks specifically at South African environmental law, planning law and local government law and offers a critical evaluation of the applicable instruments therein to determine the extent to which they can be applied to the protection of microclimate regulation services.

Chapter four commences with a discussion on the environmental authority of the local sphere of government. Thereafter, it critically considers specific municipal governance instrumentation (following the more general discussion in chapter three) that have particular relevance for the local sphere of government in the protection of microclimate regulation services. A further consideration addressed in chapter four is whether the specific instruments enable or hinder the protection of microclimate regulation services.

Chapter five presents a summary of the discussion and concluding remarks as well as recommendations.

## Chapter 2 Urban Ecosystem Services and "Microclimate Regulation"

### 2.1 Introduction

Human dependence on nature as well as human activities have significantly impacted the earth and resulted in environmental pressures such as global warming, habitat loss, changing the chemical composition of the atmosphere, over-exploitation of resources, and so forth.<sup>59</sup> As indicated in chapter one,<sup>60</sup> several authors maintain that urbanisation is one of the major causes of these environmental pressures.<sup>61</sup> Crutzen,<sup>62</sup> Zalasiewicz *et al*<sup>63</sup> and Steffen *et al*<sup>64</sup> argue that environmental problems such as those listed above and the subsequent deterioration in natural systems, especially in ecosystems, is a direct result of urbanisation and the Anthropocene.<sup>65</sup> Due to the detrimental impact of human activities and rapid environmental change, the protection of ecosystems in cities has become increasingly crucial for the natural environment, ecosystem services provision, sustainability and resilience of cities, as well as the health and well-being of humans and other organisms.<sup>66</sup> To understand the extent of the required protection, a brief discussion of the term "urban ecology" is necessary.

This chapter sets out the theoretical and conceptual basis of the study. It defines the notions of "urban ecosystems" and "urban ecosystem services". Furthermore, it analyses and determines what "microclimate regulation" entails as an urban ecosystem service in the South African context in light of the classification of

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<sup>59</sup> Chapin, Matson and Mooney *Principles of Terrestrial Ecosystem Ecology* 34, 339; Wackernagel *et al* 1999 *Ecological Economics* 375-376; Wackernagel and Rees *Our Ecological Footprint: Reducing Human Impact on the Earth* 3-15.

<sup>60</sup> See para 1.2 above.

<sup>61</sup> Du Toit and Cilliers "Urban Ecology" 753; McNeill *Something New Under the Sun: An Environmental History of the Twentieth-century World* 281-287; Brown *Eco-economy: Building an Economy for the Earth* 36; Bloom, Canning and Fink 2008 *Science* 772.

<sup>62</sup> Crutzen "The Anthropocene" 13.

<sup>63</sup> Zalasiewicz *et al* 2011 *Phil Trans R Soc A* 836.

<sup>64</sup> Steffen *et al* 2011 *AMBIO* 739 and 741.

<sup>65</sup> See para 1.1 above.

<sup>66</sup> SACN *State of South African Cities Report 2016* 189; McPhearson *et al* 2015 *Ecosystem Services* 153; see also Du Toit and Cilliers "Urban Ecology" 753.

different ecosystem services. This chapter also analyses the value of urban ecosystem services with specific reference to microclimate regulation.

## **2.2 Urban Ecology**

As a sub-discipline of ecology, urban ecology is concerned with the co-existence and development of humans and ecological processes in human-dominated systems, such as cities, as well as how they are interrelated and co-dependent.<sup>67</sup> Alberti<sup>68</sup> holds that cities as urban ecosystems cannot be studied in separate parts as urban ecology is not just a combination of human and ecological systems. She argues that they are hybrid systems that form as a result of the interactions between human and ecological systems and the processes of each of these systems occur at the same time.<sup>69</sup> In addition, Wilson<sup>70</sup> holds that urban ecology refers to knowledge about the urban environment based on a human ecological framework or context.<sup>71</sup>

The interactions above include the connections between sociological and environmental factors, the disturbances related to urban ecosystems and the effect that human actions and human-induced changes have on the environment.<sup>72</sup> For example, such effects comprise changes in the surrounding climate due to a built environment being established as well as habitat loss and the alteration, destruction

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<sup>67</sup> Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 252; Marzluff *et al* "An Introduction to Urban Ecology as an Interaction between Humans and Nature" vii; Swan *et al* 2012 *Urban Ecology* 179.

<sup>68</sup> Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 252.

<sup>69</sup> I.e. the relationships and interactions between the biotic and abiotic parts of ecosystems or between humans and the natural environment - Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 252; see Tyler and Perks "A Normative Model for Urban Ecology Practice" 230; Endlicher *et al* "Urban Ecology – Definitions and Concepts" 1; Du Toit and Cilliers "Urban Ecology" 755; Douglas "Introduction" 3.

<sup>70</sup> Wilson 1984 *Annual Review of Sociology* 284.

<sup>71</sup> The human ecological framework is based on the "ecological model where organisms interact with their environments" - see Bubolz *et al* 1980 *Social Indicators Research* 104; The human ecology theory focuses on "humans as both biological organisms and social beings in interaction with their environment" - see Bubolz and Sontag "Human Ecology Theory" 419.

<sup>72</sup> Tanner *et al* 2014 *Frontiers in Ecology and the Environment* 575-576; see also Breuste, Niemelä and Snep 2008 *Landscape Ecology* 1141.

and loss of biodiversity and sometimes even ecosystems that accompanies it.<sup>73</sup> Urban ecology also refers to the understanding of

how multiple physical, social and biotic components interact to form urban ecosystems and to become highly involved in urban planning and management.<sup>74</sup>

From the above statement, it can be inferred that urban ecology refers to the interaction of different components which result in the formation of urban ecosystems. It is further argued that urban ecology can assist local governments in planning. From a planning perspective, urban ecology concerns how sustainability, resilience, conservation, and promotion of human well-being may be achieved in cities and how the environmental impact can be reduced.<sup>75</sup> Moreover, the integration of ecology and its variety of components into decision-making processes at the planning stages of projects in municipalities has the potential to help minimise the ecological footprint and adverse effects of development on the environment. This integration potentially promotes conservation efforts and contributes to the protection of ecosystems in meaningful ways.<sup>76</sup>

It follows that urban ecology pertains to the interactions between organisms, as well as the interactions between organisms and their environments in urban areas.<sup>77</sup> The consideration of the interaction between the natural environment and human activity is necessary and of vital importance for this discussion, as it provides insights into the effect that human activities have on the environment.<sup>78</sup> Furthermore, urban ecology, as a scientific domain, indicates how urbanisation affects the ecology in city spaces as it also highlights the negative impact that urbanisation has on

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<sup>73</sup> Tanner *et al* 2014 *Frontiers in Ecology and the Environment* 576; Ossola, Irlich and Niemelä "Bringing Urban Biodiversity Research into Practice" 1.

<sup>74</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 385.

<sup>75</sup> Pickett *et al* 2001 *Annual Review of Ecology and Systematics* 129; see also Rebele 1994 *Global Ecology and Biogeography Letters* 173.

<sup>76</sup> UNEP *Integrating the Environment in Urban Planning and Management* 31.

<sup>77</sup> Gaston *Urban Ecology* 1; Du Toit and Cilliers "Urban Ecology" 755.

<sup>78</sup> Swan *et al* 2012 *Urban Ecology* 179-186; see also Breuste, Niemelä and Snep 2008 *Landscape Ecology* 1141.

biodiversity and ecosystems.<sup>79</sup> This consideration may, therefore, inform methods through which protection or conservation in cities can be achieved.<sup>80</sup>

### 2.2.1 *Ecology in and of Cities*

There are different perspectives to urban ecology, such as the "ecology *in* cities" and "ecology *of* cities" perspectives. On one hand, ecology in cities (also known as the bio-ecological perspective)<sup>81</sup> refers to ecological patterns and processes and how they compare with processes in other environments.<sup>82</sup> It further examines how particular characteristics of urban areas affect human health and well-being.<sup>83</sup> It subsequently also recognises certain benefits obtained from nature and the components in urban ecosystems and the contribution they might have in terms of human health and well-being, likely in the form of ecosystem services which are discussed below.<sup>84</sup> From the aforementioned, it can be concluded that the ecology in cities perspective pertains to particular ecosystems, interactions and components in the city. Furthermore, the ecology in cities perspective relates to how urbanisation and development affect the ecology of organisms in the complex urban habitats that are formed.<sup>85</sup> In this regard, the ecology in cities perspective relates to the effect of human activity on the abiotic environment as well as the influence these changes have on the biotic environment.<sup>86</sup> The ecology in cities perspective is based on a complex systems approach in which the interactions between human and non-human organisms and their effect on one another are considered in the urban

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<sup>79</sup> Lepczyk 2018 <https://bit.ly/2SZT606>.

<sup>80</sup> Shochat *et al* 2006 *Trends in Ecology and Evolution* 186; see also McPhearson *et al* 2016 *BioScience* 154-155.

<sup>81</sup> Du Toit and Cilliers "Urban Ecology" 755.

<sup>82</sup> The notions ecological processes and patterns are discussed by several authors in the context of urban ecology and discussions pertaining to ecology in and of cities – see in this regard Fu, Su and Lü "Coupling Landscape Patterns and Ecological Processes" 3; Heffernan *et al* 2014 *Frontiers in Ecology and the Environment* 7; Blonder *et al* 2014 *PLoS ONE* 1; Lawton 2011 *Oikos* 146; Schröder 2006 *Hydrology and Earth System Sciences* 967; Niemelä *et al* "Introduction" 2.

<sup>83</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 385.

<sup>84</sup> Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 269; Douglas 2012 *Current Opinion in Environmental Sustainability* 385-39.

<sup>85</sup> Cengiz "Urban Ecology" 678; McDonnell "The History of Urban Ecology - An Ecologist's Perspective" 24-25.

<sup>86</sup> Müller *et al* "Patterns and Trends in Urban Biodiversity and Landscape Design" 149.

context.<sup>87</sup> The ecology in cities perspective is used to "examine ecological structure and function of habitats or organisms within cities".<sup>88</sup> This perspective also reflects normal ecological concepts like environmental cycles, natural selection, as well as ecological patterns and processes. The ecology in cities perspective is further focused on the "dynamics and distribution of biota such as plants, animals and micro-organisms in cities".<sup>89</sup> Hence, ecology in cities pertain to the traditional or regular ecological methods and research applied to urban areas.<sup>90</sup> However, it is utilised in the considerations of the human influence on specific urban environments.<sup>91</sup>

In the ecology of cities perspective, on the other hand, the city in its entirety (including its biophysical, built, and social aspects) is considered an ecosystem.<sup>92</sup> From the vantage point of this perspective, also known as the socio-ecological perspective, cities are perceived as socio-ecological structures in which humans are considered alongside other non-human components. This perspective pertains to the holistic impact that all of these human and non-human components and the city have on and amongst each other in this system.<sup>93</sup> In this system, humans and other components (social or ecological) of the biotic and abiotic environment, both affect and are affected by the interactions among them.<sup>94</sup> Human activities and continuing urbanisation, for example, affect biodiversity and ecosystems through pollution and changes in land-use.<sup>95</sup> At the same time, humans are affected by ecosystems and the benefits or disadvantages they encounter in the urban space are usually in the form of ecosystem services or disservices.<sup>96</sup> In addition to these differences from

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<sup>87</sup> Tanner *et al* 2014 *Frontiers in Ecology and the Environment* 576; Wu 2014 *Landscape and Urban Planning* 211.

<sup>88</sup> Pickett *et al* 2001 *Annual Review of Ecology and Systematics* 130.

<sup>89</sup> Du Toit and Cilliers "Urban Ecology" 755; Rebele 1994 *Global Ecology and Biogeography Letters* 174; see also Wu 2008 *Landscape Journal* 42.

<sup>90</sup> McPhearson *et al* 2016 *BioScience* 201-202.

<sup>91</sup> Gaston *Urban Ecology* 3.

<sup>92</sup> This perspective incorporates the ecology in cities perspective but goes further in using systems thinking and the focus is thus moved from a particular component (as used in the ecology in cities approach) to the city as an urban ecosystem - McPhearson *et al* 2016 *BioScience* 202.

<sup>93</sup> McPhearson *et al* 2016 *BioScience* 202.

<sup>94</sup> Cenzig "Urban Ecology" 679; McPhearson *et al* 2016 *BioScience* 202.

<sup>95</sup> Cenzig "Urban Ecology" 680-681.

<sup>96</sup> Cenzig "Urban Ecology" 682.

the ecology in cities perspective, the ecology of cities perspective is an interdisciplinary one which includes perspectives from the fields of biology, ecology and other social sciences such as sociology, economics, and planning, amongst others.<sup>97</sup> The different interactions between organisms, the environment and human activities referred to above form the substance of urban ecosystems.

### **2.3 Urban Ecosystems and their Services**

Urban ecosystems are opportunity hubs in which the majority of people choose to live.<sup>98</sup> Urban areas require inputs from nature and other sources for development and growth to occur as they are highly reliant on energy, water and materials to function and survive.<sup>99</sup> These inputs are provided mostly by ecological services in the form of water supplies and resources, biodiversity, landfill zones, recreation zones, etc.<sup>100</sup> Urban ecosystems are made up of a variety of components, as discussed below, which can influence the delivery of ecological services.

#### *2.3.1 Urban Ecosystems*

McIntyre states that urban areas "encompass natural and anthropogenic components".<sup>101</sup> She further holds that urban areas contain large numbers of people, "anthropogenic forms of land use" and have "altered forms of land cover", all of which have an impact on the biota or natural environment and other characteristics of urban ecosystems.<sup>102</sup> In addition, McIntyre refers to urban areas as synthetic

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<sup>97</sup> Tanner *et al* 2014 *Frontiers in Ecology and the Environment* 574-575; Pickett *et al* 2016 *Ecosystem Health and Sustainability* 3; McPhearson *et al* 2016 *BioScience* 202; Alberti *Advances in Urban Ecology – Integrating Humans and Ecological Processes in Urban Ecosystems* 4.

<sup>98</sup> Haase *et al* 2014 *AMBIO* 413; Mega *Sustainable Cities for the Third Millennium: The Odyssey of Urban Excellence* 3-5; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 1-2.

<sup>99</sup> Douglas "Introduction" 3; Collins *et al* 2000 *American Scientist* 417.

<sup>100</sup> Douglas "Introduction" 3.

<sup>101</sup> McIntyre "Urban Ecology: Definitions and Goals" 8.

<sup>102</sup> McIntyre "Urban Ecology: Definitions and Goals" 8.

ecosystems.<sup>103</sup> As alluded to above, urban ecosystems consist of abiotic and biotic spheres and are considered complex systems in which these spheres interact.<sup>104</sup>

Ecosystems are "biological communities of interacting organisms and their physical environment".<sup>105</sup> Accordingly, natural ecosystems consist of both organisms and physical factors that form the environment of the particular biome.<sup>106</sup> Natural ecosystems are influenced or disturbed by the increase of human activities which changes the environment and activities of organisms in the particular ecosystem (by, for example, causing erosion, changes in temperature, etc.).<sup>107</sup> These environmental changes and interactions between organisms, humans, and the environment typically cause changes to occur in the structure and functioning of ecosystems within cities, leading to new types of ecosystems such as urban ecosystems.<sup>108</sup>

There is extensive scholarship on what makes up cities or urban ecosystems.<sup>109</sup> Several authors have indicated that urban ecosystems are mainly dominated by human activities and have identified the jarring effect of these activities on the environment in and around cities.<sup>110</sup> It is stated that human activities influence many

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<sup>103</sup> McIntyre "Urban Ecology: Definitions and Goals" 7-8.

<sup>104</sup> See para 2.2 above. See also Marzluff *et al* "An Introduction to Urban Ecology as an Interaction between Humans and Nature" ix.

<sup>105</sup> Stevenson and Waite *Concise Oxford English Dictionary* 454. See also s 1 of the National Environmental Management Act 107 of 1998 (hereafter the NEMA) which defines an ecosystem as "a dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit".

<sup>106</sup> Tansley 1935 *Ecology* 299; Paterson "Biological Diversity" 521; Chapin, Matson and Mooney *Principles of Terrestrial Ecosystem Ecology* 8.

<sup>107</sup> Els *Urban Ecosystem Services in Johannesburg, South Africa* 12.

<sup>108</sup> Chapin, Matson and Mooney *Principles of Terrestrial Ecosystem Ecology* 14-16.

<sup>109</sup> See, for example, Rebele 1994 *Global Ecology & Biogeography Letters* 174-175; Douglas 2012 *Current Opinion in Environmental Sustainability* 385-386; Pickett *et al* 1997 *Urban Ecosystems* 188; Whitney and Adams 1980 *Journal of Applied Ecology* 431; Walbridge 1997 *Urban Ecosystems* 1; Niemelä 1999 *Urban Ecology* 60; Ellis and Ramankutty 2008 *Frontiers in Ecology and the Environment* 439; McIntyre, Knowles-Yáñez and Hope "Urban Ecology as an Interdisciplinary Field: Differences in the Use of "Urban" between the Social and Natural Sciences" 49; Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 1; Mundoli, Unnikrishnan and Nagendra 2017 *Decision* 105; Ernstson 2013 *Landscape and Urban Planning* 8.

<sup>109</sup> Gilbert *The Ecology of Urban Habitats* x.

<sup>110</sup> Rebele 1994 *Global Ecology & Biogeography Letters* 174-175; Douglas 2012 *Current Opinion in Environmental Sustainability* 385-386; Pickett *et al* 1997 *Urban Ecosystems* 188; Whitney and

ecosystems and urban ecosystems are often characterised as being human-dominated systems.<sup>111</sup> Despite this, it is also argued that urban and other ecosystems, as well as the environment, are reliant on people for conservation and protection.<sup>112</sup> The fact that humans dominate an area is not the only criteria as to what urban ecosystems consist of as many non-urban areas would then fit this criterion.<sup>113</sup> A more encompassing and specific definition is needed.

Authors such as Rebele<sup>114</sup> state that urban ecosystems comprise of various urban habitats formed by several elements in cities. These urban ecosystems that form in cities are made up of a combination of buildings (or built-up areas) whether for residential, commercial, or industrial purposes; or other infrastructure; natural and human-made water bodies (blue patches); and green patches like gardens, parks, and land.<sup>115</sup> Douglas<sup>116</sup> goes further in providing scales in terms of describing urban ecosystems. These scales are first, "patches within the complex urban mosaic of habitats", and secondly, "built-up areas" which are the habitat of people and their pets, plants, etc. within cities.<sup>117</sup> In addition, Douglas states that urban ecosystems can be described as "the immediate urban life-support system of urban areas...providing ecosystem services", and as "areas affected by the consumption and emissions of urban areas".<sup>118</sup>

Urban ecosystems are unique and noticeably distinguishable from natural ecosystems as they are made up of diverse components, abide by different rules

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Adams 1980 *Journal of Applied Ecology* 431; Walbridge 1997 *Urban Ecosystems* 1; Niemelä 1999 *Urban Ecology* 60; Ellis and Ramankutty 2008 *Frontiers in Ecology and the Environment* 439.

<sup>111</sup> McIntyre, Knowles-Yáñez and Hope "Urban Ecology as an Interdisciplinary Field: Differences in the Use of "Urban" between the Social and Natural Sciences" 49; Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 1.

<sup>112</sup> Gilbert *The Ecology of Urban Habitats* x.

<sup>113</sup> McIntyre, Knowles-Yáñez and Hope "Urban Ecology as an Interdisciplinary Field: Differences in the Use of "Urban" between the Social and Natural Sciences" 50.

<sup>114</sup> Rebele 1994 *Global Ecology & Biogeography Letters* 175.

<sup>115</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 385; Mundoli, Unnikrishnan and Nagendra 2017 *Decision* 105; Ernstson 2013 *Landscape and Urban Planning* 8; Kaklauskas and Gudauskas "Intelligent Decision-Support Systems and the Internet of Things for the Smart Built Environment" 418.

<sup>116</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 386.

<sup>117</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 386; Douglas "Introduction" 3.

<sup>118</sup> Douglas 2012 *Current Opinion in Environmental Sustainability* 386; Douglas "Introduction" 3.

and behaviours and develop distinctly, despite consisting of a combination of human and natural ecosystems.<sup>119</sup> Cities or urban ecosystems contain a variety of areas and parts that differ both physically and in their function or use.<sup>120</sup> Urban and natural ecosystems vary in terms of temperature and climate, types of soils, hydrology, the types of species found in each, population dynamics and the flow of energy needed.<sup>121</sup> It is further held that urban ecosystems are dynamic and complex and they fluctuate and grow constantly.<sup>122</sup> These urban ecosystems grow and continue to exist due to the energy inputs, as stated earlier.<sup>123</sup> They are usually very compact with high-density populations living close to one another.<sup>124</sup> This, coupled with the built environments that result from urbanisation, causes urban habitats to be unequally distributed in patches within cities and threatens the succession of species.<sup>125</sup> Niemelä refers to this as low interaction, which can lead to further changes in the city environment.<sup>126</sup>

In comparison to natural ecosystems, urban ecosystems are often human regulated, unlike natural ecosystems which are self-regulating as a result of the activities or interactions of organisms in such natural ecosystems.<sup>127</sup> Urban ecosystems refer to a unique ecosystem in the city such as a park or wasteland, or the entire city as an urban ecosystem consisting of buildings, parks, trees, streets, etc.<sup>128</sup>

Through their natural processes and functions, urban ecosystems provide a range of different ecosystem services to the benefit or detriment of their human

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<sup>119</sup> Alberti *et al* 2003 *BioScience* 1170.

<sup>120</sup> McIntyre, Knowles-Yáñez and Hope "Urban Ecology as an Interdisciplinary Field: Differences in the Use of "Urban" between the Social and Natural Sciences" 51.

<sup>121</sup> Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 1; Rebele 1994 *Global Ecology and Biogeography Letters* 176-177.

<sup>122</sup> Savard, Clergeau and Mennechez 2000 *Landscape and Urban Planning* 139; Rebele 1994 *Global Ecology & Biogeography Letters* 174; see also Alberti *Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems* 1; Breuste, Niemelä and Snep 2008 *Landscape Ecology* 1141.

<sup>123</sup> Para 2.2 above. See also Collins *et al* 2000 *American Scientist* 417.

<sup>124</sup> Pickett *et al* 2001 *Annual Review of Ecology and Systematics* 129.

<sup>125</sup> Niemelä 1999 *Biodiversity and Conservation* 123.

<sup>126</sup> Niemelä 1999 *Biodiversity and Conservation* 123.

<sup>127</sup> Rebele 1994 *Global Ecology and Biogeography Letters* 174; Collins *et al* 2000 *American Scientist* 417.

<sup>128</sup> Rebele 1994 *Global Ecology and Biogeography Letters* 174; Alberti 1999 *Environment and Planning B: Planning and Design* 606-607.

inhabitants.<sup>129</sup> Some of the benefits include, *inter alia*, aesthetic enjoyment and value, habitat or homes for animals and people, psychological health and well-being of people, and environmental functions that in turn make the production of other ecosystem services possible.<sup>130</sup> These benefits closely relate to the definition of the "environment" as set out in the South African legislative framework<sup>131</sup> as well as the constitutional environmental right.<sup>132</sup> Despite ecosystems providing many advantages to humans, they also deliver ecosystem disservices such as natural disasters, sea-level rise, storms and sea floods, erosion, pollution, parasites, diseases, allergies, and damage to infrastructure.<sup>133</sup> Ecosystems produce these services due to the interaction of biological, chemical and physical components that exist in ecosystems.<sup>134</sup> Many definitions have been developed to describe ecosystem services. Within this theoretical framework, a few of these definitions are discussed and analysed, followed by a discussion of how these ecosystem services are classified.

### 2.3.2 *Ecosystem Services in Cities*

Different disciplines and researchers diversely interpret ecosystem services. In most cases, the definitions relate to the general description of ecosystem services provided by the MEA, which simply states that ecosystem services are services

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<sup>129</sup> TEEB *The TEEB Manual for Cities: Ecosystem Services in Urban Management* 1; Lyytimäki *et al* 2008 *Environmental Sciences* 164; Ernstson and Sörlin 2012 *Ecological Economics* 5.

<sup>130</sup> Sadler *et al* "Bringing Cities Alive: The Importance of Urban Green Spaces for People and Biodiversity" 230.

<sup>131</sup> Environment is defined in s 1 of NEMA as "the surroundings within which humans exist and that are made up of (i) the land, water and atmosphere of the earth, (ii) micro-organisms, plant and animal life, (iii) any part or combination of (i) and (ii) and the interrelationship among and between them, and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being".

<sup>132</sup> See para 1.1.

<sup>133</sup> Lyytimäki *et al* 2008 *Environmental Sciences* 164; see also Gómez-Baggethun *et al* "Urban Ecosystem Services" 186-189.

<sup>134</sup> Boyd and Banzhaf 2007 *Ecological Economics* 620; Brauman and Daily 2008 *Human Ecology* 1148-1149; TEEB *The TEEB Manual for Cities: Ecosystem Services in Urban Management* 1.

provided by nature to the benefit of human beings.<sup>135</sup> Daily<sup>136</sup> describes ecosystem services as -

...conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life.

The author mentions the sustenance and fulfilment of human life and states that human life is dependent on these services that nature provides, as they are "actual life-support functions".<sup>137</sup> She also states that biodiversity and the production of ecosystem goods are dependent on these services and that ecosystem services further pertain to the capacity of the natural processes and functions to provide benefits obtained by humans.<sup>138</sup> Costanza *et al*<sup>139</sup> note that ecosystem services are benefits obtained directly or indirectly through naturally occurring ecosystem functions. All of these definitions view humans as the recipients or beneficiaries of these services, and this also emerges from Boyd and Banzhaf's definition which holds that ecosystem services are "directly enjoyed, consumed, or used".<sup>140</sup> Furthermore, there is a multitude of debates centred around ecosystems and ecosystem services in the conservation discourse.<sup>141</sup>

Considering the above, it may be reasoned that there is a strong human focus in the existing definitions of ecosystem services. Despite the existence of ecosystem disservices,<sup>142</sup> services to the benefit of humans and their well-being are often the focus in the ecosystem services literature.<sup>143</sup> Firstly, the word "services" denotes "the action of doing work for or serving someone" or a "system supplying a need."<sup>144</sup>

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<sup>135</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 49; Suarez and Dempsey "Ecosystem Services" 173; MEA *Ecosystems and Human Well-being: Synthesis v*; MEA 2005 <https://bit.ly/2LmsNgf>; Nelson *et al* 2009 *Frontiers in Ecology and the Environment* 4.

<sup>136</sup> Daily "Introduction: What are Ecosystem Services?" 3.

<sup>137</sup> Daily "Introduction: What are Ecosystem Services?" 3. See also Brauman and Daily 2008 *Human Ecology* 1148.

<sup>138</sup> Daily "Introduction: What are Ecosystem Services?" 3; Deutsch, Dyball and Steffen "Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 509.

<sup>139</sup> Costanza *et al* 1997 *Nature* 253.

<sup>140</sup> Boyd and Banzhaf 2007 *Ecological Economics* 619.

<sup>141</sup> Suarez and Dempsey "Ecosystem Services" 174.

<sup>142</sup> See paras 2.2.1 and 2.3.1 above.

<sup>143</sup> Morrow "Of Human Responsibility: Considering the Human/Environment Relationship and Ecosystems in the Anthropocene" 275.

<sup>144</sup> Stevenson and Waite *Concise Oxford English Dictionary* 1316.

In other words, it is a service delivered to someone for their use, enjoyment or benefit. Human beings are commonly considered to be the only beneficiaries of ecosystem services, and they use these ecosystem services, often exploitatively and to the detriment of the environment.<sup>145</sup> Furthermore, the omission of disservices in the ecosystem services discourse is criticised by Lyytimäki and Sipilä.<sup>146</sup> According to these authors, the definition of ecosystem services as formulated by the MEA and other authors pertain to the "good" services provided by ecosystems and neglects to mention the "bad" services.<sup>147</sup> Disservices pertain to ecosystems services that undermine human health and well-being and mostly affect the vulnerable and poor in society.<sup>148</sup> As such, it may be necessary for policy and decision-makers to consider the disservices along with the beneficial services when planning cities. Failure to make such considerations in planning processes may exacerbate vulnerability.

There is often an economic focus in the ecosystem services discourse, in which a measurable value is attributed to ecosystem services. This value is usually a monetary valuation and is often used to incorporate the price of nature into decision-making processes.<sup>149</sup> It is described as "a framework for systematising and quantifying the many benefits that people derive from nature".<sup>150</sup> The purpose of the monetary assessment of ecosystem services is said to be to make it a visible and economically viable asset to qualify it as worthwhile to protect.<sup>151</sup> There is a notable critique against the appraisal of ecosystem services, and the argument is that not all ecosystem services can be subjected to valuation as some services' worth is not measurable. This means that such assessment may fail in ascribing

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<sup>145</sup> Woodley, Kay and Francis *Ecological Integrity and the Management of Ecosystems* vii. Kotzé and Kim aptly articulate this in their statement that "the non-human world ("nature"), has been relegated to a mere regulatory object there to satisfy the needs of environmental law's main referent, namely its human subject." – See Kotzé and Kim 2019 *Earth System Governance* 5.

<sup>146</sup> Lyytimäki and Sipilä 2009 *Urban Forestry and Urban Greening* 309; Lyytimäki *et al* 2008 *Environmental Sciences* 164; see also Gómez-Baggethun *et al* "Urban Ecosystem Services" 186-189.

<sup>147</sup> Lyytimäki and Sipilä 2009 *Urban Forestry and Urban Greening* 309.

<sup>148</sup> Shackelton *et al* 2016 *Ecosystems* 588; Lyytimäki and Sipilä 2009 *Urban Forestry and Urban Greening* 311.

<sup>149</sup> Morrow "Of Human Responsibility: Considering the Human/Environment Relationship and Ecosystems in the Anthropocene" 276-277.

<sup>150</sup> Suarez and Dempsey "Ecosystem Services" 173.

<sup>151</sup> Suarez and Dempsey "Ecosystem Services" 175.

value to some services and lead to these services being undervalued.<sup>152</sup> This focus on quantification of ecosystem services places the environment and ecosystem services in an inferior position to or makes it subject to further human-domination or decisions, even though humans inherently form part of the ecosystems in which these ecosystem services occur.<sup>153</sup> While the critique may hold true, the appraisal of ecosystem services might help decision-makers to analyse trade-offs between ecosystem services and to emphasise the importance of nature and the conservation thereof, perhaps not in monetary terms but by way of quantifying the benefits that they produce.<sup>154</sup>

Despite the habitual focus on human benefit and valuation of ecosystem services, it is often forgotten that ecosystems do not only produce services for human benefit, use, health, well-being, or livelihoods. Ecosystems also provide services needed by other parts of the ecosystem and its organisms for sustenance and to help these organisms and other parts of ecosystems function.<sup>155</sup> Ecosystems, as mentioned in Daily's definition above, also provide services that are needed by the environment for its continued existence.<sup>156</sup> These ecosystem services help ecosystems function through maintaining them and causing certain processes to occur in order to help provide other ecosystem services.<sup>157</sup> Examples of such maintenance services are soil formation and retention, nutrient cycling, pollination and photosynthesis, without which there would be no clean drinkable water and no plants, which in turn causes

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<sup>152</sup> Morrow "Of Human Responsibility: Considering the Human/Environment Relationship and Ecosystems in the Anthropocene" 277; Suarez and Dempsey "Ecosystem Services" 177.

<sup>153</sup> This is also known as the paradigm of mastery which places the environment in an inferior position and a "means to privileged humanity's ends...rendering it ripe for exploitation." It can be seen in the consequences on the environment such as "resource depletion, pollution, ecosystem and biospheric disruption." - see Morrow "Of Human Responsibility: Considering the Human/Environment Relationship and Ecosystems in the Anthropocene" 271 and 277.

<sup>154</sup> Suarez and Dempsey "Ecosystem Services" 176.

<sup>155</sup> Farber *et al* 2002 *Ecological Economics* 387; Zari "Utilizing Relationships Between Ecosystem Services, Built Environments, and Building Materials" 4 and 7; Carabine *et al* *The Contribution of Ecosystem Services to Human Resilience* 6.

<sup>156</sup> These services are referred to as supporting services. See para 2.3.3 below.

<sup>157</sup> De Groot, Wilson and Boumans 2002 *Ecological Economics* 394-395; De Groot *et al* 2010 *Ecological Complexity* 261-262; Sadler *et al* "Bringing Cities Alive: The Importance of Urban Green Spaces for People and Biodiversity" 230; Bastian 2013 *Ecological Indicators* 13; Farber *et al* 2002 *Ecological Economics* 387; MEA *Ecosystems and Human Well-being: A Framework for Assessment* 77-78 and 83; see also Zari "Utilizing Relationships Between Ecosystem Services, Built Environments, and Building Materials" 4.

no oxygen cycling and carbon sequestration.<sup>158</sup> Nevertheless, human benefit and use of ecosystem services are more widely recognised, and humans are dependent on these ecosystem services for their livelihoods, health and well-being, as well as environmental or resource security to meet their basic needs.<sup>159</sup>

Ecosystem services can improve the livelihoods of people, the resilience of a city, and the health and well-being of a community. They can also contribute to making a community feel more secure by, for example, providing services such as nutrient cycling, filtering toxins and pollutants out of the air and water, temperature regulation, pollination and photosynthesis without which nature would cease to exist.<sup>160</sup> Ecosystem services occur in all ecosystems around the world, though the focus in this chapter is on ecosystem services that occur in and around cities, particularly urban ecosystem services. While some ecosystem services are produced in these urban areas for use by that particular urban ecosystem, many ecosystem services are not produced only for use in an individual ecosystem. In other words, cities do not necessarily obtain ecosystem services only from within its boundaries, but some services are cross-boundary services or are transported into cities.<sup>161</sup> This study follows the MEA's classification for ecosystem services, which classifies ecosystem services under provisioning, cultural, supporting, and regulating services, depending on the function they serve and the type of service they deliver.<sup>162</sup>

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<sup>158</sup> MEA *Ecosystems and Human Well-being: Synthesis* 39. This also speaks to the concept of "connectivity" among ecosystems, organisms, and the various processes – see Ng, Xie and Yu 2013 *Applied Geography* 1; Jun *et al* 2015 *Journal of Geographical Sciences* 604; Nagelkerken "Introduction" 2; Mitchell, Bennett and Gonzalez 2013 *Ecosystems* 895. Connectivity is described as the way or extent to which dispersal, movement and interactions occur between organisms or processes in the environment and ecological flows – Kukkala and Moilanen 2017 *Landscape Ecology* 7. Organisms and processes are so closely connected that if one part of the cycle, of which they are a part, is negatively influenced it influences every connected part, directly or indirectly.

<sup>159</sup> Wittmer *et al* 2013 *The Economics of Ecosystems and Biodiversity* 15.

<sup>160</sup> Wittmer *et al* 2013 *The Economics of Ecosystems and Biodiversity* 15. See also Sandifer, Sutton-Grier and Ward 2015 *Ecosystem Services* 1-15.

<sup>161</sup> Grimm *et al* 2008 *Science* 757; Wu 2014 *Landscape and Urban Planning* 218; Collins *et al* 2000 *American Scientist* 2.

<sup>162</sup> TEEB date unknown <https://bit.ly/3dHbHFU>; MEA *Ecosystems and Human Well-being: Synthesis* v.

### 2.3.3 Classification of Ecosystem Services

Provisioning services are based on the output obtained from processes and functions in ecosystems and provide physical or material products.<sup>163</sup> Such services provide goods in the form of food such as livestock and crops; plants that can be used for medicinal purposes and pharmaceuticals; and fibres such as cotton, hemp and timber which can be used to manufacture products.<sup>164</sup> They also provide fuel and most importantly, water.<sup>165</sup> These services directly benefit urban residents as they are material in nature and can provide subsistence to urban residents.<sup>166</sup> In cities, the provision of goods is mostly dependent on the supply from other areas which is then transported into cities to meet their demands.<sup>167</sup> The provision of these services might also be interdependent such as food production, which can be dependent on the provision of water (irrigation is commonly used in food production).<sup>168</sup> However, the production of food may also occur in cities in the form of residents growing food themselves on rooftops of buildings, in backyard gardens, or community gardens.<sup>169</sup> Provisioning services typically add a sense of heightened quality of life to residents as they help provide food security, water security, building materials, and other products used by urbanites in their everyday lives.<sup>170</sup> City residents can use these products provided by ecosystem services with the added benefit that they do not have to hunt for, collect, or process these products themselves as stores import them from producers or factories where consumers can buy them.<sup>171</sup> This means that there is no direct interaction between the urban resident (as the consumer) and the environment, as the consumer is not involved in the planting or cultivation

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<sup>163</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 56.

<sup>164</sup> MEA *Ecosystems and Human Well-being: Synthesis* 40; Watson *et al* *UK National Ecosystem Assessment Understanding Nature's Value to Society Synthesis of Key Findings* 18.

<sup>165</sup> MEA *Ecosystems and Human Well-being: Synthesis* 40; Watson *et al* *UK National Ecosystem Assessment Understanding Nature's Value to Society Synthesis of Key Findings* 18.

<sup>166</sup> Du Toit *et al* 2018 *Landscape and Urban Planning* 254; Deutsch, Dyball and Steffen "Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 510.

<sup>167</sup> Folke *et al* 1997 *AMBIO* 171.

<sup>168</sup> Deutsch, Dyball and Steffen "Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 512.

<sup>169</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 179.

<sup>170</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 179-180.

<sup>171</sup> Deutsch, Dyball and Steffen "Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 515-533.

process, for example. This arguably causes a disconnect between consumers and the processes or ecosystem services involved in producing such goods, resulting in consumers that do not appropriately value the ecosystems that they are dependent on for these services and take them for granted.<sup>172</sup>

Cultural services include the non-material benefits or cultural values that are obtained from ecosystems and comprise "green" and "blue" spaces.<sup>173</sup> People living in cities may benefit from cultural ecosystem services by interacting with or experiencing nature in the form of urban green spaces such as parks, forests, lakes, and rivers which have many recreational opportunities. Cultural ecosystem services have the potential of reducing stress, improving general health, and fostering feelings of tranquillity, and people can enjoy them at their leisure.<sup>174</sup> Cultural ecosystem services also contribute to cognitive development, as well as the social, spiritual, recreational and aesthetic aspects of well-being by providing aesthetic enjoyment, and contribute to physical and mental health and well-being.<sup>175</sup> Furthermore, cultural services are valuable in cities as they provide residents with a sense of place and belonging which improves the social aspects in paving the way to social cohesion and a sense of community.<sup>176</sup> In addition to these values, cultural ecosystem services also provide cultural heritage and attract residents from other areas which benefit cities in terms of tourism and creating green infrastructure.<sup>177</sup> However, the use of these ecosystem services in cities are dependent on other

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<sup>172</sup> Deutsch, Dyball and Steffen "Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 530.

<sup>173</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 57; Watson *et al* *UK National Ecosystem Assessment Understanding Nature's Value to Society Synthesis of Key Findings* 18; Gómez-Baggethun *et al* "Urban Ecosystem Services" 178.

<sup>174</sup> Ossola, Irlich and Niemelä "Bringing Urban Biodiversity Research into Practice" 4; Gómez-Baggethun *et al* "Urban Ecosystem Services" 184; IUCN 2019 <https://bit.ly/2SZt4Kg>; Cilliers *et al* "Social Aspects of Urban Ecology in Developing Countries, with an Emphasis on Urban Domestic Gardens" 124.

<sup>175</sup> Hodas 2013 *PELJ* 75; IUCN 2019 <https://bit.ly/2SZt4Kg>; Korpela, Pasanen and Ratcliffe "Biodiversity and Psychological Well-being" 134-142; MEA *Ecosystems and Human Well-being: A Framework for Assessment* 77; Gatzweiler *et al* *Advancing Health and Wellbeing in the Changing Urban Environment: Implementing a Systems Approach* 30-31.

<sup>176</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 185.

<sup>177</sup> Langemeyer and Gómez-Baggethun "Urban Biodiversity and Ecosystem Services" 39-40; *Economics for the Environment The Economic, Social and Ecological Value of Ecosystem Services: A Literature Review* 2 and 12; Corvalan *et al* *Ecosystems and Human Well-being – Health Synthesis* 5.

factors such as accessibility, safety, cleanliness and order, privacy and comfort in the form of benches or sport facilities and amenities.<sup>178</sup>

Supporting services are intermediary services, which serve a maintenance, sustaining and balancing purpose as they have the "core processes and functions needed to sustain all other services" and these other services and processes in the environment are dependent on them.<sup>179</sup> Supporting services, therefore, pertain to the primary production or basic ecosystem functions, conditions or processes such as soil formation to provide fertile soil for provisioning services to occur in, nutrient and water cycling, habitat formation, and photosynthesis for the provision of oxygen.<sup>180</sup> This is relevant in cities as photosynthesis and other processes in urban ecosystems use energy, carbon dioxide and other elements to create structures used in the production of the other services, such as making goods for human consumption.<sup>181</sup> These services are thus crucial for the health of ecosystems and also affect human health and well-being, albeit indirectly.<sup>182</sup>

Regulating ecosystem services are essential for the continuation and existence of ecosystems and the organisms therein as these services regulate and attempt to balance the environment in which humans and other organisms need to live and survive.<sup>183</sup> These typically consist of a variety of services such as water purification and retention, mitigation of natural hazards (flood regulation), waste treatment, erosion protection, air quality maintenance, pollination, carbon sequestration,

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<sup>178</sup> Rall and Haase 2011 *Landscape and Urban Planning* 192.

<sup>179</sup> Bastian 2013 *Ecological Indicators* 13; Farber *et al* 2002 *Ecological Economics* 387; MEA *Ecosystems and Human Well-being: A Framework for Assessment* 77-78 and 83; Zari "Utilizing Relationships Between Ecosystem Services, Built Environments, and Building Materials" 4; Ruhl *The Law and Policy of Ecosystem Services* 17; De Groot *et al* 2010 *Ecological Complexity* 261-262; MEA *Ecosystems and Human Well-being: Synthesis* 40; Langemeyer and Gómez-Baggethun "Urban Biodiversity and Ecosystem Services" 40.

<sup>180</sup> Hodas 2013 *PELJ* 75; MEA *Ecosystems and Human Well-being: Synthesis* 40; Watson *et al* *UK National Ecosystem Assessment Understanding Nature's Value to Society Synthesis of Key Findings* 18.

<sup>181</sup> De Groot, Wilson and Boumans 2002 *Ecological Economics* 395.

<sup>182</sup> Zari "Utilizing Relationships Between Ecosystem Services, Built Environments, and Building Materials" 7.

<sup>183</sup> Zari "Utilizing Relationships Between Ecosystem Services, Built Environments, and Building Materials" 7.

disease control, and microclimate regulation.<sup>184</sup> Regulating services provide for the regulation or maintenance of certain natural processes in ecosystems and provide direct and indirect benefits to people such as shade, urban cooling, reduction of noise, pest regulation, etc.<sup>185</sup>

In cities, regulating services play a critical role in mitigating increasing temperatures as well as sequestering the increased levels of carbon and other greenhouse gases (GHG).<sup>186</sup> Regulating services are provided through the assistance of built infrastructure like buildings, streets and sidewalks as well as ecological infrastructures such as trees, water areas and vegetation that changes the local temperatures in cities.<sup>187</sup> Buildings, streets and sidewalks provide regulating services in the form of microclimate regulation services particularly, as they contribute to changes in surface and air temperature in urban areas based on their orientation, layout, height, width, accompanying land use changes, zoning, and materials.<sup>188</sup> These components affect the airflow between buildings, wind speed and direction, heat-absorption, solar reflectivity and exposure, ventilation, and shade-provision that can affect the microclimate in cities.<sup>189</sup> Trees, soil and plants provide regulating services in that they assist in the mitigation of surface-water run-off or rainwater drainage by absorbing water and preventing flooding that occurs in cities due to their impervious built surfaces.<sup>190</sup> Furthermore, the density, width and height of plants and trees cause the noise in the city to be absorbed, refracted and reflected to mitigate noise pollution which potentially has positive effects on human health and well-being.<sup>191</sup> It is argued that the focus on one ecosystem service might

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<sup>184</sup> MEA *Ecosystems and Human Well-being: Synthesis* 7 and 40; De Groot *et al* 2010 *Ecological Complexity* 262.

<sup>185</sup> MEA *Ecosystems and Human Well-being: A Framework for Assessment* 57; De Groot, Wilson and Boumans 2002 *Ecological Economics* 395; Gómez-Baggethun *et al* "Urban Ecosystem Services" 182; Sloomweg "Interpretation of biodiversity" 37.

<sup>186</sup> MEA *Ecosystems and Human Well-being: Synthesis* 7 and 39-46; Gómez-Baggethun *et al* "Urban Ecosystem Services" 181 and 183.

<sup>187</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 180-181.

<sup>188</sup> Wang *The Effect of Urban Green Infrastructure on Local Microclimate and Human Thermal Comfort* 40-41; Heris, Middel and Muller 2020 *Landscape and Urban Planning* 1-2; Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 51-52.

<sup>189</sup> Wang *The Effect of Urban Green Infrastructure on Local Microclimate and Human Thermal Comfort* 14; Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 51-52.

<sup>190</sup> Bolund and Hunhammar 1999 *Ecological Economics* 297.

<sup>191</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 181.

undermine the provision of other ecosystem services.<sup>192</sup> Therefore, it is important to mention that in some instances more than one service is provided in a specific area or by a specific component of the ecosystem, despite the singular focus in this study.<sup>193</sup> Perhaps the most important function that regulating services provide is the moderation of climate extremes and climate regulation, particularly at a local level, applying within cities (microclimate regulation). This holds true, especially considering the global climate change crisis and the fact that the climate change impact is exacerbated in cities.<sup>194</sup>

## **2.4 Microclimate Regulation**

In the context of ecosystem services, microclimate regulation forms part of regulating ecosystem services and delivers such services as climate regulation and moderation of extreme climates.<sup>195</sup> Climate regulation is attained by decreasing the effects of urban temperatures on residents' health and well-being, alleviating urban heat island effects and improving thermal comfort in urban areas.<sup>196</sup> However, urban areas are more susceptible to high temperatures due to urbanisation, deforestation and the lack of natural counterbalances to eliminate or mitigate the heat in cities.<sup>197</sup> Urbanisation, deforestation and deficient counterbalances are also exacerbating "climate variability at local, regional and global scales".<sup>198</sup> This section focuses on climate variability at the local scale within cities. Microclimates are present when the climatic conditions in a specific or small area are different from that of the areas

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<sup>192</sup> Salzman, Thompson and Daily 2001 *Stanford Environmental Law Journal* 319.

<sup>193</sup> This means, for example, that a piece of land providing water purification services by filtering water through soil can also provide flood control services, nutrient cycling, as well as growth space and necessary nutrients for food provision or plant growth, which in turn provides oxygen, filters the air, and removes toxins and pollutants, etc. Several ecosystem services can be provided from a single source or component of the environment.

<sup>194</sup> Munang *et al* 2013 *Current Opinion in Environmental Sustainability* 1; Gómez-Baggethun *et al* "Urban Ecosystem Services" 183.

<sup>195</sup> See para 2.3.3 above.

<sup>196</sup> Wang *et al* 2019 *Journal of Cleaner Production* 913; Els *Urban Ecosystem Services in Johannesburg, South Africa* 13.

<sup>197</sup> Deutsch, Dyball and Steffen Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World" 513; Solecki and Marcotullio "Climate Change and Urban Biodiversity Vulnerability" 485.

<sup>198</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 181.

around it.<sup>199</sup> Urban microclimates, similarly, occur when the local climate observed in the city differs from that of surrounding rural areas.<sup>200</sup> In this study, cities are considered to be microclimates.

In the context of microclimate regulation, the term "regulation" denotes the process of regulating something or being regulated by certain aspects in the environment of the city, which has an impact on the microclimate.<sup>201</sup> The term regulation is synonymous with managing or balancing in this context. The word regulation is thus used as it pertains to and in the context of regulating ecosystem services as discussed above.<sup>202</sup> There are many references to microclimate regulation<sup>203</sup> as a notion in literature. However, there are no pertinent definitions for it. It is averred from the work of, amongst others, Wang *et al*,<sup>204</sup> Zhang, Zhu and Jiang,<sup>205</sup> as well as Dimoudi *et al*,<sup>206</sup> that microclimate regulation occurs when objects in the environment such as, *inter alia*, trees, wetlands, and buildings influence the climate of the particular space around them and form a microclimate. For example, the microclimatic conditions can be altered by a change in air temperature, humidity, evapotranspiration, solar radiation, wind speed, atmospheric pressure or cloud cover.<sup>207</sup> Microclimate regulation in cities entails the regulation of the temperature, humidity and precipitation of areas within cities through serving several functions which can alter the local microclimate.<sup>208</sup> Microclimate regulation has several

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<sup>199</sup> Geiger *The Climate Near the Ground* xix; Stevenson and Waite *Concise Oxford English Dictionary* 902.

<sup>200</sup> Toparlar *et al* 2018 *Applied Energy* 853. The term "microclimate regulation" as used in this study signifies a regulating ecosystem service that pertains to the "maintenance of favourable climate in a local area". The term should not be construed as meaning something different than stated above in par 2.4 and the use of the word regulation, in conjunction with microclimate, must not be read in its legal sense ("the act or process of controlling by rule or restriction" – see Garner *Black's Law Dictionary* 1289).

<sup>201</sup> Stevenson and Waite *Concise Oxford English Dictionary* 1212.

<sup>202</sup> See para 2.3.3 above.

<sup>203</sup> Takács, Kiss and Gulyás 2014 *Acta Climatologica et Chorologica* 100; Wang *et al* 2018 *iForest* 140-147; Dimoudi *et al* 2013 *Energy and Buildings* 1-9; Zhang, Zhu and Jiang 2016 *Sustainability* 1.

<sup>204</sup> Wang *et al* 2018 *iForest* 140-147.

<sup>205</sup> Zhang, Zhu and Jiang 2016 *Sustainability* 1.

<sup>206</sup> Dimoudi *et al* 2013 *Energy and Buildings* 1-9.

<sup>207</sup> Wang *The Effect of Urban Green Infrastructure on Local Microclimate and Human Thermal Comfort* 27.

<sup>208</sup> Smith *et al* 2013 *Journal of Applied Ecology* 813.

functions which typically include the provision of shade, temperature regulation, soil and air humidity regulation, etc., which play an essential part in the cooling of urban areas.<sup>209</sup> These mentioned functions make microclimate regulation services worthy of protection because they help mitigate the heat island effect and anthropogenic heating caused in cities, which in turn improves the resilience of the city and decreases the negative impact that heating has on the environment and ecosystems.<sup>210</sup>

The urban heat island effect occurs when the temperature in urban areas is higher than that of the surrounding areas.<sup>211</sup> The difference between urban and rural air temperatures is due to the alteration of the climatic and microclimatic conditions that buildings and human activities cause in urban areas.<sup>212</sup> The heat island effect is mainly caused by the built environment and the interactions, feedbacks and exchanges that occur therein such as absorption of solar radiation, momentum, energy flows, heat emissions and pollutants released by human activities.<sup>213</sup> The urban heat island effect has a negative impact on human health and well-being in that it can cause a plethora of heat-related problems.<sup>214</sup> The heat also deters people from spending time outdoors (in urban green spaces as mentioned above)<sup>215</sup> to the further detriment of their physical and mental health and well-being.<sup>216</sup> The urban heat island effect, further exacerbates the intensity, duration and occurrence of heatwaves as well as air quality.<sup>217</sup> These heatwaves cause the consumption of energy in the city to increase in an attempt to cool buildings via the use of air conditioning devices, resulting in more pollutants and heat being emitted.<sup>218</sup> As a

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<sup>209</sup> Wang *et al* 2018 *iForest* 142; Zhang, Zhu and Jiang 2016 *Sustainability* 1-12.

<sup>210</sup> Gaitani *et al* 2011 *Building Serv Eng Res Technol* 54.

<sup>211</sup> Givoni *Urban Design in Different Climates* 1-2; Santamouris 2013 *Renewable and Sustainable Energy Reviews* 225.

<sup>212</sup> Gaitani *et al* 2011 *Building Serv Eng Res Technol* 53.

<sup>213</sup> Solecki and Marcotullio "Climate Change and Urban Biodiversity Vulnerability" 486; Santamouris 2013 *Renewable and Sustainable Energy Reviews* 225 Dimoudi *et al* 2013 *Energy and Buildings* 1.

<sup>214</sup> See Brown 2018 *Atmosphere* 1; Gaitani *et al* 2011 *Building Serv Eng Res Technol* 54; Harlan *et al* 2006 *Social Science and Medicine* 2848.

<sup>215</sup> Para 2.3.3 above.

<sup>216</sup> Brown 2018 *Atmosphere* 1; Gaitani *et al* 2011 *Building Serv Eng Res Technol* 54.

<sup>217</sup> Dimoudi *et al* 2013 *Energy and Buildings* 1.

<sup>218</sup> Bolund and Hunhammar 1999 *Ecological Economics* 296.

result, the heat-island effect is aggravated and heightens the ecological footprint of cities.<sup>219</sup>

Air pollution, urbanisation and the urban heat island effect are inextricably linked. Air pollution is a significant contributor to higher temperatures and microclimate change.<sup>220</sup> Air pollution is the result of GHG<sup>221</sup> and other gases and pollutants being emitted into the atmosphere and affecting the climate at local, regional and global levels.<sup>222</sup> To a large extent, air pollution is caused by human activities, including transportation, heating of buildings and energy production; all of which significantly aggravate the heat island effect.<sup>223</sup> The emission of GHG and the resulting increase in temperature in cities is mostly the result of fossil fuels being burned for energy, industrial processes and other changes in land use.<sup>224</sup> Natural processes such as decomposition of dead organic matter, however, also cause carbon dioxide (CO<sub>2</sub>) to be released into the atmosphere.<sup>225</sup> In addition, GHG causes an increase in the earth's global mean surface temperatures emitted through the everyday activities of humans.<sup>226</sup> GHG emissions disrupt the natural dynamics and balance of naturally occurring gases and cause these gases to build up in the atmosphere.<sup>227</sup> Such disturbances and modifications to the composition of the atmosphere lead to changes in the amount of solar radiation at the city level, and thus affects the weather and temperature.<sup>228</sup> Furthermore, the inability of infra-red radiation to leave the atmosphere due to smog, the build-up of gases and increased pollution also exacerbates the heat island effect and contribute to higher temperatures within urban areas.<sup>229</sup> The increase of CO<sub>2</sub> in the atmosphere exceeds the storage capacity

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<sup>219</sup> Toparlar *et al* 2018 *Applied Energy* 869; Gaitani *et al* 2011 *Building Serv Eng Res Technol* 54  
Dimoudi *et al* 2013 *Energy and Buildings* 1.

<sup>220</sup> Dimoudi *et al* 2013 *Energy and Buildings* 1.

<sup>221</sup> GHG includes gasses such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).

<sup>222</sup> The Nature Conservancy *Nature in the Urban Century* 43.

<sup>223</sup> Bolund and Hunhammar 1999 *Ecological Economics* 295.

<sup>224</sup> Gaitani 2011 *Building Serv Eng Res Technol* 54; Moriarty "Carbon Budgets" 495; Georgii 1969 *Bull World Health Organ* 631.

<sup>225</sup> Daily *et al* 1997 *Issues in Ecology* 6-7.

<sup>226</sup> Intergovernmental Panel on Climate Change (IPCC) *Climate Change 2014: Synthesis Report* 44-47.

<sup>227</sup> Moriarty "Carbon Budgets" 495. Increased GHG emissions alter the composition of the Earth's carbon, nitrogen and other biogeochemical cycles – See Daily *et al* 1997 *Issues in Ecology* 15.

<sup>228</sup> Georgii 1969 *Bull World Health Organ* 628-629.

<sup>229</sup> Georgii 1969 *Bull World Health Organ* 631.

of carbon sinks, causing temperatures to rise and cause subsequent changes in climates, including microclimates.<sup>230</sup> Outdoor and indoor air pollution is also intensified by the burning of biofuels,<sup>231</sup> especially in poorer, more vulnerable communities, where people highly rely on biofuels for their livelihoods.<sup>232</sup> The problem that exists is that there is not efficient dispersion or ventilation of pollutants, as wind strength is decreased in certain areas due to the height of buildings, and the way the city was built, etc.<sup>233</sup>

Urban climates are influenced by aspects such as the layout and size, the structure and materials of buildings, geographical location, population size and density as well as vegetation contained in the city.<sup>234</sup> Microclimates may form as a result of mountain ranges, water bodies (such as wetlands and rivers) or vegetation, urban parks, streets, buildings in that particular area, or activities which cause environmental variables.<sup>235</sup> Examples of environmental variables are temperature, light, wind speed, and moisture changes that differ from that in rural areas.<sup>236</sup>

Sealed surfaces contribute to the heat in urban areas as they prevent rainfall or water runoff from penetrating the soil and lead to the destruction of vegetation areas and release of pollutants.<sup>237</sup> Certain buildings, due to the building materials used, may also have thermal capacity and, therefore, store heat, which contributes to the temperature rise in city areas.<sup>238</sup> This dramatically affects and alters the microclimate in cities and causes, amongst other problems, the so-called heat island

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<sup>230</sup> Moriarty "Carbon Budgets" 495.

<sup>231</sup> Smil "Biofuels" 491. "The incomplete combustion of solid biomass fuels release high concentrations of toxic pollutants such as particulate matter (PM), carbon monoxide (CO), oxides of nitrogen, sulphur dioxide (SO<sub>2</sub>) and volatile organic compounds into the living environment" – Barnes *et al* 2009 *Journal of Energy in Southern Africa* 4.

<sup>232</sup> Barnes *et al* 2009 *Journal of Energy in Southern Africa* 7.

<sup>233</sup> Georgii 1969 *Bull World Health Organ* 634-635.

<sup>234</sup> Givoni *Urban Design in Different Climates* 1-2; Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 51-52; Shahrestani *et al* 2015 *Renewable Energy* 9.

<sup>235</sup> Chen *et al* 1999 *BioScience* 288; Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 52.

<sup>236</sup> Chen *et al* 1999 *BioScience* 288; Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 52.

<sup>237</sup> Kuttler "The Urban Climate – Basic and Applied Aspects" 233.

<sup>238</sup> Georgii 1969 *Bull World Health Organ* 631.

effect discussed above.<sup>239</sup> Moreover, cities may have several sealed surfaces close to green spaces and these may suppress the cooling effect and temperature moderation that green spaces such as urban parks provide.<sup>240</sup>

Streets also play an important part in the microclimate of cities as they absorb heat from solar radiation and cause the surrounding area to be warmer. The width and orientation of the streets, pavements, shading sources, and height of buildings simultaneously determine or influence the microclimate in the streets by changing wind direction, heat intake or output, and temperature differences in shade versus that out of shade.<sup>241</sup> Adding components such as shade, taller buildings, street vegetation, narrower roads, etc. all contribute to a lower intake of solar radiation.<sup>242</sup>

As discussed above, urban green infrastructure and public green spaces alleviate some of the pressures of the urban heat island effect through their cooling effect, and they provide thermal comfort which contributes to human health and well-being.<sup>243</sup> Urban green infrastructure includes things such as urban parks, urban forests, street trees, green roofs, etc.<sup>244</sup> It is argued that larger green spaces provide better temperature moderation services that assist in the microclimate regulation in cities.<sup>245</sup> Vegetation is not only an important combatant of high urban temperatures in the form of street trees but also has significant microclimate contributions in larger urban green areas. This is due to the shading effect of vegetation and its role in reflecting, absorbing, and transmitting solar radiation, as well as the storing and sequestration of carbon.<sup>246</sup> Vegetation affects microclimates by disrupting or causing changes in the air temperature, humidity, wind speed and mean radiant

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<sup>239</sup> Mohajerani, Bakaric and Jeffrey-Bailey 2017 *Journal of Environmental Management* 523.

<sup>240</sup> Breuste *et al* 2013 *Ekológia* 294.

<sup>241</sup> Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 51-62.

<sup>242</sup> Yahia and Johansson 2013 *Journal of Housing and the Built Environment* 63-64.

<sup>243</sup> Wang *et al* 2019 *Journal of Cleaner Production* 913, 926; Yan *et al* 2012 *Procedia Environmental Sciences* 756; Takács *et al* 2016 *Procedia Environmental Sciences* 98; Tumini, García and Rada 2016 *International Journal of Sustainable Building Technology and Urban Development* 3; Salata *et al* 2017 *Sustainable Cities and Society* 79.

<sup>244</sup> Wang *et al* 2019 *Journal of Cleaner Production* 913; Wang *et al* 2017 *iForest* 145; Toparlar *et al* 2018 *Int J Climatol* 303.

<sup>245</sup> Breuste *et al* 2013 *Ekológia* 294, 302.

<sup>246</sup> Takács, Kiss and Gulyás 2014 *Acta Climatologica et Chorologica* 99-102; Yan *et al* 2012 *Procedia Environmental Sciences* 756.

temperature.<sup>247</sup> Besides this important function, trees also cause evapotranspiration to occur, where water is absorbed from several different sources and then turned into water vapour. It is then released into the atmosphere, which plays an integral part of the cooling of the surrounding local microclimate.<sup>248</sup> Deforestation and destruction of these contributors to microclimate regulation significantly reduce precipitation and lead to further extreme climates.<sup>249</sup>

Wetlands<sup>250</sup> are, similarly, imperative to microclimate regulation as they store heat and cause evapotranspiration to occur. They influence the climate of the surrounding area and cause a cooling effect in the climate of the nearby cities.<sup>251</sup> Wetlands are very productive ecosystems as they provide several services, such as retaining and purifying toxins and chemicals as well as recharging groundwater.<sup>252</sup> Wetlands are considered to have certain unique properties such as radiation, thermal and water properties that result in cooling and humidifying effects in the area surrounding such wetlands.<sup>253</sup> Wetlands are also said to safeguard areas against floods and droughts in some instances by retaining water during dry seasons and are known to act as carbon-sinks providing the service of carbon sequestration.<sup>254</sup> Because of their role as carbon-sinks, wetlands assist microclimate regulation by storing carbon in their soil, peat and vegetation and in so doing

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<sup>247</sup> Takács, Kiss and Gulyás 2014 *Acta Climatologica et Chorologica* 101. The canopies of trees can have varying effects on its own, and different tree species can, therefore, provide different degrees of microclimate regulation through temperature and humidity control based on the type of leaves and the area that they cover, the density of the canopy, etc. See Yan *et al* 2012 *Procedia Environmental Sciences* 764.

<sup>248</sup> Takács, Kiss and Gulyás 2014 *Acta Climatologica et Chorologica* 103; Solecki and Marcotullio "Climate Change and Urban Biodiversity Vulnerability" 497-498; Yan *et al* 2012 *Procedia Environmental Sciences* 756.

<sup>249</sup> Daily *et al* 1997 *Issues in Ecology* 6.

<sup>250</sup> In the South African legislative framework, wetlands are considered to be "land which is transitional between terrestrial and aquatic systems, where the water table is usually at, or near the surface, or the land that is periodically covered with shallow water and which land in normal circumstances supports, or would support, vegetation adapted to life in saturated soil." See s 1 of the NWA.

<sup>251</sup> Zhang, Zhu and Jiang 2016 *Sustainability* 1-2; Şimşek and Ödül 2018 *Applied Geography* 49; Pokorný, Huryňa and Harper "Greenhouse Gas Regulation by Wetlands" 5.

<sup>252</sup> Dinsa and Gameda 2019 *J Appl Sci Environ Manage* 1298.

<sup>253</sup> Şimşek and Ödül 2018 *Applied Geography* 49.

<sup>254</sup> Janse *et al* 2019 *Current Opinion in Environmental Sustainability* 11; Villa and Bernal 2018 *Ecological Engineering* 116.

reduces GHG emissions.<sup>255</sup> However, the deterioration or destruction of wetlands has the potential to turn them into ecosystem disservices.<sup>256</sup> As disservices, they become sources of GHG emissions rather than stores of carbon and cause the stored gases to be released back into the environment, which contributes in turn to the heating of the city as discussed above.<sup>257</sup> The deterioration and destruction of wetlands are primarily attributed to climate change and human activities such as deforestation, development of built-up areas and infrastructure, over-exploitation, as well as land-use changes.<sup>258</sup>

## **2.5 The South African Context**

South Africa is an arid country with little more than 90 per cent of its landscape consisting of drylands, accompanied by the fact that many parts of South Africa are faced with severe droughts.<sup>259</sup> Several provinces including the Western Cape, Eastern Cape, Northern Cape, and parts of Gauteng, have been declared disaster risk areas in the past few years owing to the severity of droughts in these areas.<sup>260</sup> The drought conditions have become so dire that the Department of Co-operative Governance and Traditional Affairs declared the persisting drought conditions a national disaster in March 2020, calling for a change in existing drought relief measures.<sup>261</sup> The national state of disaster has subsequently not been extended, and a decision was made to revoke the classification of drought as a national disaster in terms of the *Disaster Management Act 57* of 2002.<sup>262</sup> This decision was highly criticised,<sup>263</sup> especially in light of continued water scarcity and persisting

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<sup>255</sup> Dinsa and Gameda 2019 *J Appl Sci Environ Manage* 1298.

<sup>256</sup> See para 2.3.2 above.

<sup>257</sup> Mitsch 2016 *National Wetlands Newsletter* 9; Crooks *et al Mitigating Climate Change through Restoration and Management of Coastal Wetlands and Near-shore Marine Ecosystems: Challenges and Opportunities* 5; Finlayson "Climate Change and Wetlands" 2.

<sup>258</sup> Mitsch 2016 *National Wetlands Newsletter* 6; Dinsa and Gameda 2019 *J Appl Sci Environ Manage* 1297-1298; Erwin 2009 *Wetlands Ecol Manage* 71-84.

<sup>259</sup> South African Government 2020 <https://www.gov.za/about-sa/environment>.

<sup>260</sup> PN 301 in PG 4336 of 29 October 2019; PN 157 in PG 7811 of 21 August 2017; PN 149 in PG 2143 of 18 October 2017.

<sup>261</sup> GN 243 in GG 43066 of 4 March 2020.

<sup>262</sup> GN 767 in GG 43526 of 16 July 2020.

<sup>263</sup> This critique came particularly from South Africa's largest commercial farmers lobby group, Agri SA. – See Reuters 2020 <https://bit.ly/2D0Ixow>; News24 2020 <https://bit.ly/3juuVSW>.

droughts in the country.<sup>264</sup> Despite the droughts, the country is home to nine biomes<sup>265</sup> and plentiful biological diversity.<sup>266</sup> Biodiversity is also confronted with many challenges. Natural habitats and vegetation are declining rapidly in several provinces due to cultivation, mining and unabated urban expansion and development.<sup>267</sup> The country's biodiversity is not only threatened by cultivation, mining, development, or ecosystem degradation, but it is also contending with invasive species. South Africa uses the Red List system proposed by the International Union for Conservation of Nature (IUCN).<sup>268</sup> Many plant and animal species have found their way on to this list due to their threatened status. Habitat loss, the destruction of natural vegetation and ecosystem degradation is mostly attributed to changes in land-use.<sup>269</sup> These changes, as discussed above, influence the capacity of ecosystems to provide ecosystem services.<sup>270</sup> Despite covering a mere five per cent of the land, ecosystems such as indigenous forests, inland wetlands, estuaries, and beaches provide a disproportionate amount of ecosystem services including water purification, storm protection, climate regulation, carbon

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<sup>264</sup> The Vaal Dam, which is considered vital for economic growth and is an important water resource (supplying water to about 33 per cent of the country's population and 46 per cent of the economy), was only 36 per cent full in September 2020 – Daily Maverick 2020 <https://bit.ly/3cpjLf6>. Furthermore, it was contended that the Eastern Cape is still experiencing "one of the worst droughts in its history" and boreholes in several districts were drying up "due to the dwindling underground water table" and poor water quality – Herald Live 2020 <https://bit.ly/3kGPTxQ>. In addition, Port Elizabeth is said to have reached "Day Zero" and is experiencing extreme water shortages due to the severe droughts in the Eastern Cape – Times Live 2020 <https://bit.ly/3cojx8e>.

<sup>265</sup> These are the Grassland, Savanna, Succulent Karoo, Nama Karoo, Forest, Fynbos, Desert, and Thicket biomes as well as the Indian Ocean Coastal Belt. See South African Government 2020 <https://www.gov.za/about-sa/geography-and-climate>; South African Government 2020 <https://www.gov.za/about-sa/environment>.

<sup>266</sup> South Africa is ranked in the top three countries world-wide for its biological diversity, see para 1.1 above. It is also "home to nearly: 10 per cent of the world's plants; 7 per cent of the reptiles, birds and mammals, and 15 per cent of known coastal marine species". See South African Government 2020 <https://www.gov.za/about-sa/environment>.

<sup>267</sup> SANBI *Life: The State of South Africa's Biodiversity 2012* 6. These provinces include Gauteng, KwaZulu-Natal, and North West Province.

<sup>268</sup> SANBI *Life: The State of South Africa's Biodiversity 2012* 49. The Red List system is a way of categorizing and identifying species that are at risk of extinction in the near future and contains categories such as critically endangered, endangered, and vulnerable. This system also makes provision for "other species of concern" which are categorised as: "extinct, extinct in the wild, near threatened, data deficient, rare or critically rare.

<sup>269</sup> SANBI *Life: The State of South Africa's Biodiversity 2012* 12.

<sup>270</sup> See para 2.3.2 above.

storage, and recreation.<sup>271</sup> The ecosystems and biomes also have economic benefits through the tourism sector that is dependent mainly on natural assets and green spaces. They are among the main contributors to the country's gross domestic product (GDP).<sup>272</sup>

In terms of water sources, the country has 23 Ramsar sites.<sup>273</sup> However, wetlands are the least protected ecosystems and are severely threatened with an approximate 88 per cent of wetland area classified as threatened.<sup>274</sup> Moreover, the country's rivers are in poor ecological condition with two-thirds of the span of the nation's rivers being degraded.<sup>275</sup> Furthermore, the Republic has many Strategic Water Source Areas (SWSAs) that provide fresh water to urban areas. The SWSAs contribute significantly to the country's water needs and its economy as they provide fresh water to half of the population.<sup>276</sup> Wetlands, the runoff from SWSAs, as well as freshwater flowing from rivers through estuaries and into the ocean also contribute to climate regulation in the areas close to these water sources.<sup>277</sup> The NBA highlights certain priority areas in which conservation interventions are necessary. These areas include estuaries along the Cape west coast and KwaZulu-Natal, as well as inland wetlands in the Highveld and Cape Fold Mountains.<sup>278</sup> Coupled with the bad water quality and state of these aquatic ecosystems, the aquatic biodiversity in these areas are also at risk of depletion and extinction.<sup>279</sup>

A study by Hardy and Nel<sup>280</sup> indicated that Johannesburg, South Africa's most densely populated city, contains an urban heat island which is particularly dominant

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<sup>271</sup> SANBI *National Biodiversity Assessment 2018* (hereafter the NBA) 7.

<sup>272</sup> SANBI *Life: The State of South Africa's Biodiversity 2012* 9.

<sup>273</sup> South African Government 2020 <https://www.gov.za/about-sa/environment>; SANBI NBA 7.

<sup>274</sup> SANBI NBA 2. In terms of inland wetlands, only about six per cent are well protected, while around 61 per cent are critically endangered, nine per cent are endangered and nine per cent are vulnerable.

<sup>275</sup> SANBI NBA 17.

<sup>276</sup> SANBI NBA 4.

<sup>277</sup> SANBI NBA 5.

<sup>278</sup> SANBI NBA 12.

<sup>279</sup> It was found that freshwater fish in South Africa are among the most threatened species, further limiting the livelihoods of people and economic ventures on which the country and its people depend on - SANBI NBA 17.

<sup>280</sup> Hardy and Nel 2015 *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 203, 205-206.

in the heavily populated areas, as opposed to areas that have greenery or water bodies.<sup>281</sup> Heat-trapping concrete and tar (that form sealed surfaces which also prevents water runoff from reaching the soil) used in built-up areas that characterise cities and the roads that connect them, especially in central city areas, significantly increases the temperatures that city-dwellers have to deal with. In some instances, these heat-trapping materials are said to cause up to a 6°C temperature difference in city areas as opposed to rural areas.<sup>282</sup> Central business districts (CBDs), such as those in the metros generally have high urban temperatures during weekdays because of the movement of people in and out of the city for work.<sup>283</sup> It is estimated that the temperatures in the country will rise with 1-2°C along the coastal areas and 2-3°C in the central areas by 2050.<sup>284</sup>

In relation to air pollution, the country has the 38<sup>th</sup> worst air quality in the world and is ranked as having moderate air quality.<sup>285</sup> Certain hotspots were identified where ambient air quality standards are being surpassed, and they are considered pollution priority areas.<sup>286</sup> Domestic fuel combustion has been identified as one of the main contributors to air pollution and was found to occur predominantly in high-density low-income areas.<sup>287</sup> In these dense settlements, as discussed above,<sup>288</sup> there are high concentrations of pollutants that do not get diluted or filtered.<sup>289</sup> Like in other countries, excessive air pollution can be attributed to particular sources

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<sup>281</sup> Johannesburg has also been found to have the most polluted heat island, followed by Cape Town and Durban.

<sup>282</sup> This occurs especially in metropolitan areas such as Pretoria, Johannesburg, Cape Town and Durban. See Kings 2017 <https://bit.ly/3p6HWUZ>.

<sup>283</sup> Monama *Evaluating the Urban Heat Island over the City of Tshwane Metropolitan Municipality Using Remote Sensing Techniques* 12.

<sup>284</sup> SANBI *Life: The State of South Africa's Biodiversity 2012* 40. This means that long-term weather trends will become less predictable and more variable, and the country will experience more severe extreme weather events such as droughts, floods, and heat waves at more frequent intervals.

<sup>285</sup> IQAir 2020 <https://www.iqair.com/south-africa>. This is the position among 193 assessed countries.

<sup>286</sup> Section 18 of the *National Environmental Management Air Quality Act* 39 of 2004 (hereafter NEMAQA). See also GN 666 in GG 42464 of 17 May 2019.

<sup>287</sup> GN 666 in GG 42464 of 17 May 2019. In addition, areas in metropolitan and district municipalities, adjacent to or within urban agglomerations were identified as critical areas. See also Department of Environmental Affairs (DEA) *Air Quality* 184.

<sup>288</sup> See para 2.4 above.

<sup>289</sup> GN 666 in GG 42464 of 17 May 2019.

such as transportation, waste disposal, power generation, biomass and biofuel burning, landfill sites, etc.<sup>290</sup> Despite considerations of alternative and renewable energy sources, the country is still mostly dependent on fossil fuels such as coal used for electricity generation, which is a significant contributor to the amount of air pollutants.<sup>291</sup> The industrial and mining sectors are the other culprits that affect air pollution as they are highly dependent on energy and fossil fuels. Furthermore, industrial developments and mines are often situated close to urban areas containing high densities of people.<sup>292</sup> Waste incineration and landfills are also responsible for a considerable portion of the GHG emissions due to gases being released during these processes.<sup>293</sup> Due to mostly sunny weather conditions, the country is said to have a stable atmospheric layer which traps pollutants and prevents them from dispersing.<sup>294</sup> The Highveld region of Mpumalanga, especially, has very poor air quality due to the amount of mining and other industrial activities that occur in this area.<sup>295</sup> Air pollution is also visible above cities such as Johannesburg, Durban and Cape Town in the form of smog (brown haze) that covers the skyline.<sup>296</sup> Certain conditions, such as weather-related conditions, ozone, surface temperatures, typography, vehicles, wood burning, emissions from informal settlements, and aerosol distribution also encourage smog build-up in cities.<sup>297</sup>

Industrialisation and its concomitant consequences such as urbanisation, consumerism and production of waste are causing the over-exploitation and pollution of the natural resource base upon which the country depends for the livelihoods, well-being, economic development, and continued existence of its communities.<sup>298</sup> Furthermore, the drought experienced in many parts of the country

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<sup>290</sup> DEA *Air Quality* 183; Engelbrecht and Kornelius "Air Quality Management" 380-385.

<sup>291</sup> Coal is the core supply of energy, earning the country a place in the top 15 largest CO<sub>2</sub> emitters worldwide – Winkler 2020 <https://bit.ly/38eKAAX>; McSweeney and Timperley 2018 <https://bit.ly/37sCYfb>; DEA *Air Quality* 184; Engelbrecht and Kornelius "Air Quality Management" 381.

<sup>292</sup> DEA *Air Quality* 185.

<sup>293</sup> Engelbrecht and Kornelius "Air Quality Management" 383.

<sup>294</sup> Van Tienhoven and Scholes "Air Pollution Impacts on Vegetation in South Africa" 237-238.

<sup>295</sup> Van Tienhoven and Scholes "Air Pollution Impacts on Vegetation in South Africa" 238.

<sup>296</sup> This smog is also referred to as brown haze in some instances. – See Walton *Characteristics of Cape Town Brown Haze v.*

<sup>297</sup> Walton *Characteristics of Cape Town Brown Haze* 4-11.

<sup>298</sup> Kotzé "The Regulation of Environmental Pollution" 241.

exacerbates the hot temperatures in these areas and negatively influences the microclimates.<sup>299</sup> The decline and threats that face plant biodiversity and natural vegetation also offer little solace amid the rising temperatures, especially in urban areas, as the destruction of these ecosystems severely limits the effects that plants and other vegetation have on the regulation of temperatures in microclimates.<sup>300</sup>

The same can be said for wetlands and other water sources near urban areas which are being destroyed and depleted.<sup>301</sup> These wetland and water sources close to cities have the potential to lower the temperatures in cities through evapotranspiration. When destroyed or degraded these water sources lose their capabilities of acting as carbon sinks, microclimate regulators and water purifiers. As suggested earlier, air pollution is a significant problem. It affects the ecosystems in and around cities to such an extent that they cannot deliver important ecosystem services such as microclimate regulation. Furthermore, the pollution in cities intensifies the heat island effect by trapping heat and preventing it from filtering out of the city.<sup>302</sup>

## **2.6 Concluding Remarks**

The objective of this chapter was to deepen understanding of the notions of the urban ecosystem and ecosystem services as relevant for this study. The chapter considered the theoretical underpinnings of content in the scientific domain of urban ecology and conducted a literature review of the meaning of these concepts. Furthermore, based on the definitions of urban ecosystems and ecosystem services, the aim was to establish the value offered by urban ecosystems and urban ecosystem services for the benefit of humans. This aim was achieved through a consideration of the arguments made by scholars and the critiques levelled against valuation approaches. Lastly, the objective was to determine what microclimate regulation entails in the South African context, in light of the classification of ecosystem services as provided for by the MEA. The categorisation of ecosystem

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<sup>299</sup> Davis-Reddy "Observed Trends in Climate over Southern Africa" 6.

<sup>300</sup> Emilsson and Sang "Impacts of Climate Change on Urban Areas and Nature-based Solutions for Adaptation" 17.

<sup>301</sup> Gómez-Baggethun *et al* "Urban Ecosystem Services" 180-181.

<sup>302</sup> Li *et al* 2018 *Science of the Total Environment* 819.

services established by the MEA is used in this study as it forms the basis for the definitions of ecosystem services by other scholars.

Considerations of what urban ecosystems entail are broad, and many authors have tried their hand at providing encompassing definitions.<sup>303</sup> However, all of them fall short in terms of a definition for urban ecosystems as there is no universally accepted definition of what this notion entails as the authors all use different characteristics and parameters in their attempts at a definition.<sup>304</sup> Through inspecting some of these definitions, it was possible to find workable parameters of what an urban ecosystem would constitute.<sup>305</sup> It is observed that through the processes and functions of nature in urban and other ecosystems, certain benefits are derived, making way for the discussion on the elusive definition of ecosystem services.<sup>306</sup> As with urban ecosystems, a universally agreed upon definition for the notion of ecosystem services evaded many scholars, each contributing a little to a full, all-inclusive definition.<sup>307</sup> Most definitions of ecosystem services started to contain similar features, and it became possible to formulate a workable definition. Like many movements throughout history, the notion of ecosystem services garnered critique, especially with respect to the allocation of value to nature's services. Still, these are easy to dismiss in light of the benefits gained from the use of such services.<sup>308</sup> In this study, the ecosystem services are categorised based on these benefits, into the four categories as identified by the MEA.<sup>309</sup> Generally, research pertaining to specific ecosystem services are focused on cultural and provisioning services, while there is little information about regulating services and hardly any research done on supporting services.

From the discussion in this chapter, it is gleaned that microclimate regulation plays a prominent role in the urban ecosystem context and many environmental issues

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<sup>303</sup> See paras 2.3.1 above.

<sup>304</sup> See para 2.3.1 above.

<sup>305</sup> See para 2.3.1 above.

<sup>306</sup> See para 2.3.2 above.

<sup>307</sup> See para 2.3.2 above.

<sup>308</sup> See para 2.3.2 above.

<sup>309</sup> See the brief categorical discussion in 2.3.3 above.

stem from a failure to mitigate the temperature and climate within cities.<sup>310</sup> Furthermore, microclimate regulation is pertinent for sustainability and environmental protection and its great impact on the urban heat island effect in cities.<sup>311</sup> Current research on microclimate regulation as an ecosystem service in the urban context is relatively scant, and the existing research utilised in this study pertains mostly to smaller research or experiment areas such as residential gardens and green roofs, for example. A great deal of literature identifying issues related to climate change and environmental degradation due to the impact of humans is available.

Microclimate regulation has not yet gained the necessary traction in the South African context. Notwithstanding, the situation concerning the country's ecosystems and biodiversity are indicative of a dire need for action and control of microclimate regulation by way of protecting ecosystem services and the ecosystems in which they occur. There is an opportunity for advanced city-specific research in South Africa. In addition, the improvement of available data and information regarding the effects of environmental degradation and pollution in cities on microclimate regulation and how microclimate regulation can address these issues is required.

The South African context alluded to above acts as evidence that the integration of the environment, its ecosystems and the ecosystem services into city planning and development is lacking. Furthermore, it indicates that ecosystem services are possibly misunderstood and wrongly valued, leading to under-protection of crucial natural ecosystem service "providers" such as wetlands crucial to microclimate regulation. It is, therefore, evident that more needs to be done to realise environmental protection in and around cities.

It is, therefore, necessary to consider existing legislative measures and other protective methods and to ensure that they are suited to the circumstances of the country. Resultantly, it is important to identify and critically evaluate the existing South African legal framework, including the environmental, planning and local

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<sup>310</sup> See para 2.4 above.

<sup>311</sup> See para 2.4 above.

government law and policies. The evaluation can determine whether they enable or hinder the protection of microclimate regulation as an ecosystem service. This can be achieved through the identification and critical analysis of relevant instruments in existing legislation and policies.

## Chapter 3 Options in Law for the Protection of Microclimate Regulation Services

### 3.1 Introduction

Chapter two of this study established that there are several threats to environmental resources which are essential for the healthy functioning of ecosystem services, and particularly for microclimate regulation.<sup>312</sup> Given the South African context discussed earlier,<sup>313</sup> it is evident that the country's urban ecosystems require protection and management to ensure the sustainability of the services that they offer. The domestic legal and regulatory framework contains several measures that may be utilised for the protection of the environment.

The environment and its protection receive constitutional acknowledgement in the Bill of Rights. The constitutional environmental right is generally considered to be anthropocentric as humans enjoy centrality, benefit and a legal entitlement to the use of the natural environment.<sup>314</sup> However, there have been arguments deviating from a strictly anthropocentric approach towards a more ethical approach, which contends for a moral obligation towards the environment as well as an instrumental approach claiming protection for and avoiding harm to the environment.<sup>315</sup> Du Plessis argues that an instrumental approach regards the environment as worthy of protection not only due to its profitability and benefit to humanity but also because it carries intrinsic value.<sup>316</sup> Du Plessis holds further that the environmental right, though mainly regarded as anthropocentric, "cannot be viewed entirely from an anthropocentric point of

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<sup>312</sup> See paras 1.1 and 2.1 and 2.4 above. See also Kometa, Kimengsi and Petiangma 2018 *Environmental Management and Sustainable Development* 21-22.

<sup>313</sup> See para 2.5 above.

<sup>314</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 29-30. The anthropocentric nature can be seen in the framing of the right and the explicit reference to "not harmful to human health and well-being" in s 24(a), "present and future generations" as well as the inclusion of the notion of sustainable development in s 24(b) of the Constitution. This rather anthropocentric focus accentuates "the utility of the environment and ecosystem services to the benefit of human health and well-being" – Kotzé 2014 *The Anthropocene Review* 258. See also Boyd *The Environmental Rights Revolution* 40.

<sup>315</sup> Burns as quoted by Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 32.

<sup>316</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 32.

view".<sup>317</sup> This argument holds especially if it is considered in tandem with the definition of the environment provided in NEMA. This argument also holds considering the protective measures provided for in various sectoral environmental management acts (SEMAs) affording protection to specific areas or species in the natural environment.<sup>318</sup> In essence, it is argued that when the environmental right is interpreted, a nuanced and more flexible anthropocentric approach should be followed.<sup>319</sup> Such an approach is cognisant of the environment and its protection even if it does not "immediately and obviously relate to human use of the environment".<sup>320</sup>

The environmental right is framed as a substantive right. It entails positive action to be taken by the state to protect the environment "for the benefit of present and future generations" by employing legislative measures in order to prevent pollution as well as ecological degradation.<sup>321</sup> It thereby places a duty on the state to ensure that the environment is protected.<sup>322</sup> In addition to the positive action required on the part of the state, Du Plessis<sup>323</sup> and Feris<sup>324</sup> argue that the way in which this right is framed also constitutes that the state should refrain from transgressing these rights through negative actions.<sup>325</sup> In other words, the implied negative duty placed on the state means that the state should refrain from acting in a way that infringes the right to an

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<sup>317</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 34.

<sup>318</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 34; Kidd "Environment" 518.

<sup>319</sup> It is suggested, for example, that the anthropocentric approach is adjustable and can be accommodating to "environmental-ethics and religious-based environmental convictions so as to facilitate recognition of the instrumental value of the natural environment" - Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 51.

<sup>320</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 53. Du Plessis argues that "[a]nthropocentrism is so broadly construed that it could simultaneously serve human benefit and be beneficial to the environment per se without sacrificing its core meaning" and states also that "the substance of environmental rights therefore does not necessarily have to be interpreted by employing an exclusively anthropocentric or completely non-ecocentric approach" - Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 51. See also Kidd "Environment" 517.

<sup>321</sup> See s 24(b) of the Constitution. See also Boyd *The Environmental Rights Revolution* 25.

<sup>322</sup> See Kidd "Environment" 518.

<sup>323</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 57.

<sup>324</sup> Feris "Environmental Rights and Locus Standi" 133.

<sup>325</sup> Venter *Constitutional Comparison* 130-132; Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 57-64. See also Boyd *The Environmental Rights Revolution* 25.

environment that is not harmful to the health and well-being of people and "that negates environmental protection or that is in any way harmful to the environment."<sup>326</sup> It is also argued that by ensuring and realising the foundational values of the Constitution and other select human rights, environmental protection may be advanced due to the intertwined nature of these values and rights.<sup>327</sup> Substantive rights, like the environmental rights discussed here, are generally supported by procedural rights such as the rights to just administrative action, access to information and access to courts.<sup>328</sup>

The Constitution inherently provides for the enactment and implementation of framework legislation aimed at the protection of the environment by providing that such protection be realised "through reasonable legislative and other measures."<sup>329</sup> As such, the NEMA has been enacted and it places an obligation on the state to protect the environment.<sup>330</sup> Besides the enactment of NEMA, this obligation on the state to protect the environment has prompted various other sectoral laws and policies to be adopted and implemented.<sup>331</sup> These laws and policies deal with aspects of the environment at large. However, they also deal more specifically with aspects regarding biodiversity,<sup>332</sup> coastal management,<sup>333</sup> protected areas,<sup>334</sup> and water resources,<sup>335</sup> for example. Along with the environment receiving constitutional acknowledgement, it is argued that within the ambit of these laws and policies, ecosystem services also receive attention as there are provisions that deal specifically with the protection of

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<sup>326</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 59; s 24(a) of the Constitution. Feris "Environmental Rights and Locus Standi" 133.

<sup>327</sup> Kotzé 2015 *LitNet Akademies* 837. Examples of rights interlinked with the environmental right include the right to life (s 11 of the Constitution), right to dignity (s 10 of the Constitution), the right to access to sufficient food and water (s 27 of the Constitution).

<sup>328</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 59. These procedural rights will be discussed in more depth in para 3.3 below.

<sup>329</sup> Section 24(b) of the Constitution.

<sup>330</sup> Du Plessis 2018 *SAJHR* 192.

<sup>331</sup> Examples are the specific environmental management acts (SEMA) which include the NEMAQA, NEMBA, *National Environmental Management Integrated Coastal Management Act* 24 of 2008 (hereafter NEMICMA), NEMPAA, *National Environmental Management Waste Act* 59 of 2008 (hereafter NEMWA), as well as policies like the *National Biodiversity Assessment, National Biodiversity Strategy and Action Plan, National Biodiversity Framework*, etc.

<sup>332</sup> The NEMBA.

<sup>333</sup> The NEMICMA.

<sup>334</sup> The NEMPAA.

<sup>335</sup> The NWA and the *Water Services Act* 108 of 1997 (hereafter the WSA).

ecosystem services, which include microclimate regulation services and others, which can be used to realise such protection.<sup>336</sup>

It is necessary within a constitutional dispensation, such as South Africa's, to consider legal directives, principles, as well as norms and standards when interpreting rights and legislation as they guide the interpretation and implementation of such rights and legislation.<sup>337</sup> The directives and principles include, for example, the rule of law,<sup>338</sup> the doctrine of separation of powers (*trias politica*),<sup>339</sup> co-operative governance,<sup>340</sup> the

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<sup>336</sup> Ecosystem services find resonance in the environmental legislation and are inter alia included in s 1 of the NEMA. Cultural ecosystem services are provided for in the words "aesthetic and cultural properties" while provisioning services can be identified in the statement that the environment is made up of land and water (which can in the case of the former be used to plant crops that ensure the provision of food and in the case of the latter constitutes water that can be used to meet the basic water needs of people or benefit people in other ways). In addition, it can be argued that the definition of environment in section 1 of NEMA also includes supporting and regulation services as it mentions the interrelationships between the land, water and atmosphere and micro-organisms, plant and animal life - s 1 of the NEMA.

<sup>337</sup> Currie and De Waal *The Bill of Rights Handbook* 7-8.

<sup>338</sup> The rule of law entails the supremacy of the law, equality before the law, preventing the arbitrary or *ultra vires* exercise of governmental powers as provided by law, consistency in the application and enforcement of the law by courts. As well as the protection of fundamental rights. See s 1 of the Constitution; De Vos *et al South African Constitutional Law in Context* 78-79, 81-82; Dicey *Introduction to the Study of the Law of the Constitution* 202-203; Currie and De Waal *The Bill of Rights Handbook* 10-13.

<sup>339</sup> The separation of powers (*trias politica* principle), found in the distinction between the legislative, executive and judicial branches of government, the varied functions they serve and authority they possess, aim to prevent the accumulation and abuse of power in one government entity – see *Glenister v President of the Republic of South Africa* 2009 1 SA 287 (CC) para 30; Currie and De Waal *The Bill of Rights Handbook* 18; ss 40, 42, 85, 92, and 165(1) of the Constitution; *Certification of the Constitution of the Republic of South Africa* 1996 (4) SA 744 (CC) para 109. See also Hoexter *Administrative Law in South Africa* 24; De Vos *et al South African Constitutional Law in Context* 108, 143.

<sup>340</sup> Co-operative governance is regarded as the co-operation and reciprocated support between different spheres of government; an integrated system of close intergovernmental relations and integrated approaches based on "mutual trust and good faith" on matters of shared interest, in the co-ordination of actions, legislation and adherence to agreed procedures. Co-operative governance further requires that the different spheres refrain from taking on any legislative or executive powers or functions that fall outside their purview in terms of the Constitution - see ss 40(1) and 41 of the Constitution; Kotzé "Environmental Governance" 110-114, 121; Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere* 148; Nel, Du Plessis and Retief "Key Elements for Municipal Action" 50; Malan 2005 *Politeia* 230; Owosuyi 2015 *PELJ* 2040-2041; Owosuyi *Culture in the Pursuit of Sustainable Development in South Africa: A Legal Approach* 210.

principle of legality,<sup>341</sup> and the principle of subsidiarity.<sup>342</sup> Along with these principles, there are checks and balances that serve the purpose of establishing accountability among and between the different branches of government and preclude them from interfering with each other's functions and powers.<sup>343</sup> From an environmental protection point of view, this elucidates that the law assigns various functions and tasks to the different spheres and branches of government and also creates reporting responsibilities between and among them as checks and balances to ensure that they comply with the requirements set out by legislation.<sup>344</sup>

These legal directives and principles as well as the interpretation and implementation of the law are further subject to environmental and developmental principles. The NEMA provides for several environmental management principles that apply to all actions at the different spheres of government and are intended to serve as a framework "within which environmental management and implementation plans must be formulated".<sup>345</sup> The environmental management principles listed in section 2 of NEMA include, for example, sustainable development;<sup>346</sup> limiting the loss of biodiversity and disturbance of ecosystems;<sup>347</sup> the minimisation of pollution;<sup>348</sup> waste avoidance;<sup>349</sup> equitable and responsible use of resources;<sup>350</sup> and environmental management,<sup>351</sup>

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<sup>341</sup> The principle of legality holds that governmental powers only have legitimacy and validity as long as they are lawful and determines that government may only act in terms of mandated authority. Furthermore, this principle sets out that where the law does not make provision for the specific activities, such activities may be invoked as long as they are not contrary to any provisions in law – see De Vos *et al South African Constitutional Law in Context* 82-83.

<sup>342</sup> De Vos *et al South African Constitutional Law in Context* 78-84, 102; Currie and De Waal *The Bill of Rights Handbook* 10-14, 18-21; De Visser *Subsidiarity in the Constitution* 1.

<sup>343</sup> Currie and De Waal *The Bill of Rights Handbook* 20-21; *Certification of the Constitution of the Republic of South Africa* 1996 (4) SA 744 (CC) para 109. To assist with these checks and balances there are also Chapter 9 institutions, that have the task of monitoring the different branches of government. These institutions are meant to foster accountability and ensure that the government fulfils their constitutional obligations – see ss 181(1), (2) and (5) of the Constitution; De Vos *et al South African Constitutional Law in Context* 258.

<sup>344</sup> Examples of this can be found in schedules 4 and 5 of the Constitution that assigns different legislative competencies to different spheres of government and also throughout legislation such as the NEMA which outlines the sphere and person responsible for specific tasks.

<sup>345</sup> Section 2(1)(b) of the NEMA.

<sup>346</sup> Section 2(3), 2(4)(a) and (i) of the NEMA.

<sup>347</sup> Section 2(4)(a)(i) of the NEMA.

<sup>348</sup> Section 2(4)(a)(ii) of the NEMA.

<sup>349</sup> Section 2(4)(a)(iv) of the NEMA.

<sup>350</sup> Section 2(4)(a)(v) and (vi), as well as s 2(4)(d) of the NEMA.

<sup>351</sup> Section 2(4)(b) of the NEMA.

especially in instances of sensitive, vulnerable and stressed ecosystems.<sup>352</sup> Much like NEMA, the *Spatial Planning and Land Use Management Act* (SPLUMA)<sup>353</sup> sets out principles that have the objective of guiding the preparation, adoption and implementation of spatial development frameworks, policies or by-laws in respect of spatial planning and the development or land-use by the relevant organs of state.<sup>354</sup> These principles include the principles of spatial justice, spatial sustainability,<sup>355</sup> efficiency,<sup>356</sup> spatial resilience,<sup>357</sup> and good administration.<sup>358</sup> Along with these principles, there are several references to norms and standards for instances where limitations and criteria are necessary for monitoring, controlling and regulating activities pertaining to the environment and use thereof effectively and uniformly.<sup>359</sup>

Against this background, this chapter aims to identify and critically evaluate the existing instruments in the South African legal framework, inclusive of the environmental, planning, and local government law and policies that enable or hinder the protection of microclimate regulation as an ecosystem service. This chapter is structured as a discussion on the assortment of instruments provided for in legislation that may be utilised to realise the protection of microclimate regulation services. The chapter focuses specifically on the following range of instruments: voluntary and compulsory environmental governance instruments and directives, legal enforcement

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<sup>352</sup> Section 2(4)(r) of the NEMA.

<sup>353</sup> *Spatial Planning and Land Use Management Act* 16 of 2013 (hereafter the SPLUMA).

<sup>354</sup> Section 6(1)(a) of the SPLUMA.

<sup>355</sup> Section 7(b)(iii) of the SPLUMA.

<sup>356</sup> Section 7(c)(i) of the SPLUMA.

<sup>357</sup> Section 7(d) of the SPLUMA.

<sup>358</sup> See s 7(a)-(e) of the SPLUMA.

<sup>359</sup> NEMAQA, for example, enables all spheres of government to set standards pertaining to air quality. They may also determine the quantities and emissions of identified substances that are permissible in ambient air and that may be emitted by controlled emitters. NEMBA similarly establishes that norms and standards may be issued to achieve management and conservation of the biodiversity and its components, protection of ecosystems in their entirety, and restricted activities which may adversely affect the aforementioned. It further holds that norms and standards regarding provincial and municipal environmental conservation plans may be determined in the national biodiversity framework – ss 9(1)(a) and 39(2) of NEMBA. Similar provisions are present in the NEMICMA, NEMPAA, NEMWA, and WSA – see ss 45(2)(e) and 90 of the NEMICMA, s 11(1)(a) of the NEMPAA, ss 7, 8 and 9 of the NEMWA, and ss 6(1) and 9 of the WSA, respectively. See also s 146(2)(b)(i) of the Constitution.

measures in the form of both administrative and judicial action, as well as instruments that can be utilised by NGOs and other civil actors in community action.

### ***3.2 Voluntary and Compulsory Environmental Governance Instruments and Directives***

#### *3.2.1 Conservation Instruments*

The NEMA aims to streamline environmental considerations into decision-making and planning due to the intertwined nature of planning and urban ecosystems as discussed in chapter two.<sup>360</sup> The NEMA and the SEMAs provide for a range of measures and instruments to be developed and implemented to bring about environmental protection that may also be utilised for microclimate regulation services in urban agglomerations.

##### 3.2.1.1 Listed Activities and Regulations

The NEMA determines that certain activities may be listed through the promulgation of regulations to the effect that such activities are precluded from occurring without prior authorisation.<sup>361</sup> Examples of listed activities to this effect that have an impact on the microclimate regulation include the clearance of indigenous vegetation and the extraction or removal of peat or peat soils in wetlands for purposes other than rehabilitating the wetland, and the expansion of infrastructure, facilities, or developments, among others.<sup>362</sup> The government may use the listing procedures to include restricted activities that are known to exacerbate heat islands in city areas or cause pollutants and emissions to be released into the environment, as in these examples. Furthermore, the Minister may, in terms of NEMA, make regulations that

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<sup>360</sup> See s 23 of NEMA. See also para 2.3 above.

<sup>361</sup> In law they are referred to as "listed activities". S 24(2) of the NEMA. This section includes a provision to the effect that geographical areas may be identified on which listed activities may not take place, based on the environmental characteristics of these areas. Listed activities which require authorisation in terms of the NEMA are incorporated into three listing notices, namely: GN R983 in GG 38282 of 4 December 2014, GN R984 in GG 38282 of 4 December 2014; GN R985 in GG 38282 of 4 December 2014.

<sup>362</sup> See activities 27, 34 and 47 of GNR 983 in GG 38282 of 4 December 2014; activities 15 and 24 in GNR 984 in GG 38282 of 4 December 2014; activities 12 and 15 in GNR 985 GG 38282 of 4 December 2014.

prohibit, restrict or control activities that may harm the environment or ecosystems.<sup>363</sup> This illustrates that government may use regulations and the listing of harmful or potentially harmful activities in those regulations as an instrument to protect the environment as well as ecosystem services such as microclimate regulation. In certain instances, the law allows for environmental management instruments such as norms and standards to be established by way of regulations.<sup>364</sup> The law further allows for regulations *vis-à-vis* procedures regarding the "preparation, evaluation, adoption, and review", as well as criteria and conditions with which such instruments need to comply.<sup>365</sup> Environmental regulations further serve to impose restrictions and responsibilities on applicants looking to conduct certain listed activities as a way to control their behaviour and prevent them from causing environmental harm.<sup>366</sup>

In terms of the NEMA, regulations may be made by the relevant Minister (or MEC) to set forth the applicable procedure for obtaining and managing environmental authorisations.<sup>367</sup> Licensing and authorisation authorities are required to consider all matters related to Environmental Impact Assessments (EIAs),<sup>368</sup> including any regulations pertaining to EIAs. Regulations will also often contain provisions on what constitutes a violation or offence and prescribe penalties for contraventions of the applicable regulation.<sup>369</sup> In addition, regulations may determine the criteria for

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<sup>363</sup> Section 44(1)(aA) of the NEMA.

<sup>364</sup> Examples of this can be found in the NEMBA (s 97), the NWA (s 143) and the NEMPAA (s 86(1)(f)). See also para 3.3.5.1 above.

<sup>365</sup> Other environmental management instruments, in terms of which the procedure for preparation, evaluation, adoption and review may be laid out in regulations include "environmental management frameworks, strategic environmental assessments, environmental impact assessments, environmental management programmes, environmental risk assessments, environmental feasibility assessments, and spatial development tools" - s 24(5)(bA) of the NEMA. See also s 24(5)(bB) of the NEMA.

<sup>366</sup> Section 44(1)(aA) of the NEMA; McManus "Environmental Regulation" 546.

<sup>367</sup> This includes, *inter alia*, procedures "to be followed in applying for, the issuing of and monitoring compliance with environmental authorisations, ... administration and processing ..., fair decision-making and conflict management ..., [exemptions], appeals ...," etc. – see s 24(5) of the NEMA.

<sup>368</sup> See para 3.2.3.2 below for an in-depth discussion on EIAs.

<sup>369</sup> Sections 25(5)(g) and 44(3) of the NEMA. This may include offences for which admission of guilt fines may be paid – see s 34G of the NEMA. See also s 55(2) of the NEMAQA, s 98(2) of the NEMBA, s 85(3)(d) of the NEMICMA, s 88(2) of the NEMPAA, s 71(2) of the NEMWA, s 69(2) of the NWA in this regard.

reporting on and monitoring of compliance with the regulation and its contents.<sup>370</sup> As briefly mentioned above, regulations may also be drafted for purposes of the prohibition, restriction and control of activities that may have an adverse effect of the environment.<sup>371</sup>

With regard to the SEMAs, the NEMAQA provides for regulations on compliance measures, penalties for non-compliance in terms of the implementation and enforcement of priority areas,<sup>372</sup> and air quality management plans.<sup>373</sup> In terms of the NEMAQA, the Minister may draft regulations regarding -

any matter necessary to give effect to the Republic's obligations in terms of an international agreement relating to air quality and climate change; ...; emissions, including the prohibition of specific emissions, from point, non-point and mobile sources of emissions, including motor vehicles; open fires and incinerators; ozone-depleting substances; ...; appeals against decisions of officials in the performance of their functions in terms of the regulations; incentives to encourage change in behaviour towards air pollution by all sectors in society; ...; requirements in respect of monitoring; the avoidance or reduction of harmful effects on air quality from activities not otherwise regulated in terms of this Act;...<sup>374</sup>

The regulation of these matters may positively contribute to the protection of microclimate regulation, as they result in the decrease of emissions and pollutants which are detrimental to ecosystems and the services they offer, and exacerbate the heat island effect in cities.<sup>375</sup> In addition, the *Integrated Resource Plan, 2019 (IRP)* highlights that coal-based power plants must meet minimum emission standards in terms of regulations under the NEMAQA for them to continue operations and avoid being non-compliant and unduly contributing to air pollution and associated urban

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<sup>370</sup> See s 24(5)(h) of the NEMA. Such regulations may, as an example, require spheres of government to keep environmental records, to perform in terms of certain allocated duties and conduct performance and monitoring assessments in order to prove compliance with the relevant law or regulations – see Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 106.

<sup>371</sup> Section 44(1)(aA) of the NEMA. This sentiment is also emphasized and echoed in the following sections of the SEMAs: s 55(1)(a) of the NEMAQA; s 98(1)(a) of the NEMBA; s 85(3)(a) of the NEMICMA; ss 86(1)(d), 88 and 89(3) of the NEMPAA, s 71(1)(a) of the NEMWA.

<sup>372</sup> A 'priority area' may be declared in terms of s 18 of the NEMAQA for areas in which the "ambient air quality standards are being, or may be, exceeded ...or any other situation exists that is causing, or may cause, a significant negative impact on air quality in the area; and this requires specific air quality management action to rectify the situation."

<sup>373</sup> See s 20 of the NEMAQA.

<sup>374</sup> Section 53 of the NEMAQA.

<sup>375</sup> See para 2.4 above.

heating.<sup>376</sup> In terms of the IRP 2019, South Africa's energy mix was brought into question as it relies heavily (80 per cent) on coal-based energy generation. Coal-based energy is a significant contributor to emissions and pollutants being released into the air and affecting the environment, local temperature, climate, and the health and well-being of people close to such power plants.<sup>377</sup>

The NEMBA allows the Minister to establish regulations regarding "minimising of the threat to the ecological integrity of a listed ecosystem;"<sup>378</sup> "the ecologically sustainable utilisation of biodiversity;"<sup>379</sup> "the management of threatened or protected species that cause damage;"<sup>380</sup> biosafety and the environment;<sup>381</sup> and issues related to the issuing of permits;<sup>382</sup> among others.<sup>383</sup> Regulations in terms of the NEMBA are of particular importance to the protection of the environment and ecosystem services as they are aimed at the reduction of environmental harm and degradation caused by certain activities. Hence, the implementation of regulations in terms of the NEMBA can foster the protection of ecosystems that deliver ecosystem services in the form of microclimate regulation.

The NEMPAA sets out provisions for the composition of regulations with respect to the restriction of activities and developments in protected areas.<sup>384</sup> The NEMPAA also provides for the promulgation of regulations in respect of other matters related to protected areas such as biodiversity management and conservation; the use of biological resources in protected areas; the use of land and water; other activities in protected areas; along with access to protected areas; and community-based natural resource utilisation.<sup>385</sup> As protected areas may be declared for purposes of safeguarding sensitive and vulnerable ecosystems within cities, it is arguable that regulations for protected areas in terms of the NEMPAA may be drafted to include

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<sup>376</sup> Item 2.2 in IRP 2019.

<sup>377</sup> Item 3 of the IRP 2019.

<sup>378</sup> Section 97(1)(b)(vi) of the NEMBA.

<sup>379</sup> Section 97(1)(b)(viii) of the NEMBA.

<sup>380</sup> Section 97(1)(b)(xi) of the NEMBA.

<sup>381</sup> Section 97(1)(d) of the NEMBA.

<sup>382</sup> Section 97(1)(f) of the NEMBA.

<sup>383</sup> See further s 97 of the NEMBA.

<sup>384</sup> See both ss 49 and 51 of the NEMPAA.

<sup>385</sup> Section 86(1)(c) of the NEMPAA.

such sensitive ecosystems and the services they offer in relation to microclimate regulation.

Sections 69, 69A and 70 of the NEMWA have a bearing on the regulations that may be drafted in respect of: the identification and categorisation of waste; how particular and priority waste must be managed and disposed of; compliance monitoring; waste management planning; required measures for environmentally sound waste management, waste management activities, and the implementation of waste minimisation.<sup>386</sup> The regulation and management of activities related to waste are crucial if South Africa is to minimise the consumption of natural resources<sup>387</sup> and prevent pollution and environmental degradation to an extent that compromises ecosystem services,<sup>388</sup> especially in urban areas as well as securing sustainable development.<sup>389</sup> Another matter in terms of which the Minister may draft regulations is the general duty in respect of waste management to set out the measures that a holder of waste must follow so as not to cause pollution that may contribute to environmental harm, degradation and the release of more carbon into the air which result in further heating in city areas.<sup>390</sup>

The NWA sets out a plethora of provisions in respect of regulations, similar to the abovementioned SEMAs. Regulations in terms of the NWA may be established for matters such as the use of water and limitations on the purpose, manner and extent of water use, the restriction of activities to protect a water resource or instream or riparian habitat; and management of any discharge of waste into a water resource.<sup>391</sup> The goal of these regulations is ultimately to promote the sustainable use of water; to conserve and protect water resources, and to facilitate the monitoring of water use and water resources.<sup>392</sup> The regulation of matters linked to the water resources of the country, which is already sparse<sup>393</sup> is crucial to ensure that the nation's limited water

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<sup>386</sup> See s 69 for an extensive list of matters that may be included in regulations under the NEMWA.

<sup>387</sup> Section 2(a)(i) of the NEMWA.

<sup>388</sup> Section 2(a)(v) of the NEMWA.

<sup>389</sup> Section 2(a)(vi) of the NEMWA.

<sup>390</sup> See s 16 of the NEMWA.

<sup>391</sup> See s 26(1) of the NWA.

<sup>392</sup> See s 26(4) of the NWA.

<sup>393</sup> See para 2.5 above.

resources and the essential services that they offer, such as microclimate regulation,<sup>394</sup> are protected, used, developed, managed, and controlled.<sup>395</sup> Such regulations are further crucial for the South African context to ensure equitable use of and access to water resources while reducing pollution and degradation of such water resources to foster the protection of ecosystem services, including microclimate regulation services.<sup>396</sup>

It follows that regulations can be a useful instrument with which certain management and protection goals can be achieved, especially concerning microclimate regulation services. They are a useful tool for establishing norms, standards, and requirements against which activities can be measured to ensure that they do not cause harm to the environment and ecosystems or that such potential harm is limited, avoided, or controlled.

In addition to regulations, the assortment of measures encompassed in the array of environmental legislation comprises of, *inter alia*, the declaration of bioregions, biodiversity areas, and protected areas, as well as listing ecosystems and species.

### 3.2.1.2 Bioregions and Biodiversity Areas

The NEMBA provides that geographic areas may be declared as bioregions for environmental conservation and protection purposes after identifying them as priority areas for conservation action or establishing them as protected areas.<sup>397</sup> Bioregions may be declared in instances where an area contains "whole or several nested ecosystems" and is "characterised by its landforms, vegetation cover, human culture and history".<sup>398</sup> Bioregions may also be designated in cities upon the request of the

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<sup>394</sup> See para 2.4 above.

<sup>395</sup> See s 2(a) of the NWA.

<sup>396</sup> Sections 2(b), (d), (g), and (h) of the NWA. See also ss 90, 100, 116, 123, and 143 of the NWA.

<sup>397</sup> Sections 39(1)(c) and 40 of the NEMBA. This is in line with the s 2 NEMA principles relating to protection, conservation and rehabilitation of ecosystems and biodiversity that are threatened, polluted or degraded as well as stressed or vulnerable ecosystems - See ss 2(4)(a)(i)-(iv) and 2(4)(r) of the NEMA.

<sup>398</sup> Section 40(1)(a) of the NEMBA. See also objective 1.2 item 1(c) of the Biodiversity White Paper which holds that Government will "introduce legal measures and incentives to conserve important ecosystems, habitats, and landscapes outside of protected areas, including rangelands and their associated vegetation and indigenous wildlife resources." – see objective 1.2 item 1(c) in the Biodiversity White Paper.

relevant municipality if they meet the characteristics mentioned above.<sup>399</sup> Cities arguably meet these characteristics as they form part of the ecosystem, are considered ecosystems in and of themselves, and consist of nested ecosystems.<sup>400</sup> Furthermore, cities share distinct and similar landforms and vegetation in the form of built infrastructure with dispersed green areas providing ecosystem services.<sup>401</sup> Several cities in South Africa, including the cities of Tshwane and Cape Town are designated as bioregions.<sup>402</sup> Both the cities of Tshwane and Cape Town have Bioregional Plans which makes explicit provision for climate adaptation measures which include ecological processes and services. However, they do not explicitly mention microclimate regulation services.<sup>403</sup> When a bioregion is established, a bioregional plan must be formulated for the management of such area and the biodiversity therein.<sup>404</sup>

A bioregional plan is intended -

to provide a map of biodiversity priorities with accompanying land-use planning and decision-making guidelines, to inform land-use planning, environmental assessment and authorisations, and natural resource management by a range of sectors whose policies and decisions impact on biodiversity.<sup>405</sup>

The establishment of bioregions should thus be integrated with planning as well as environmental management considerations. Giving priority to threatened or endangered ecosystems, including the ecosystems in city areas, by way of declaring them as bioregions or biodiversity priority areas and incorporating them with planning and developmental decision-making is instrumental in promoting ecosystem protection.<sup>406</sup>

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<sup>399</sup> Section 40(2)(b) of the NEMBA. See also item 3.2 in GN 291 in GG 32006 of 16 March 2009 (hereafter the Bioregion Guideline).

<sup>400</sup> See para 2.3.1 above.

<sup>401</sup> See para 2.3.1 above.

<sup>402</sup> City of Tshwane *Bioregional Plan for the City of Tshwane* 11-12; City of Cape Town Municipality *City of Cape Town Bioregional Plan* 21.

<sup>403</sup> See City of Tshwane *Bioregional Plan for the City of Tshwane* 21-22; City of Cape Town Municipality *City of Cape Town Bioregional Plan* 12, 14 and 27.

<sup>404</sup> Section 40(1)(b) of the NEMBA.

<sup>405</sup> Item 2.1 in Gen Not 291 in GG 32006 of 16 March 2009.

<sup>406</sup> Objective 2.3 item 1 in the Biodiversity White Paper. See also SANBI *Mapping Biodiversity Priorities* viii – which holds that "prioritisation produces a set of biodiversity priority areas that should be the focus of conservation action." This document also highlights the importance of spatial data and mapping in identifying priority areas and illustrating key biodiversity issues – See SANBI *Mapping Biodiversity Priorities* 2.

The NEMBA allows for integrated and coordinated biodiversity planning and monitoring.<sup>407</sup> Biodiversity planning comprises the formulation and adoption of a national biodiversity framework with the intent to create a uniform approach to biodiversity management.<sup>408</sup> This framework must recognise any priority biodiversity areas and protected areas and may determine norms and standards as discussed above.<sup>409</sup> The national biodiversity framework should also inform and guide the development of provincial and municipal environmental conservation and biodiversity management plans and frameworks.<sup>410</sup> These instruments may be used by government as part of their environmental protection mandate, to establish more biodiversity priority areas in the form of municipal parks and green spaces in urban areas and integrate more vegetation into city centres. Furthermore, such areas may be declared to protect essential green infrastructure such as wetlands in and close to cities to ensure the protection of microclimate regulation ecosystem services and the benefits it holds for local climate and the combatting of urban heat islands.

### 3.2.1.3 Declaration of Protected Areas

The NEMPAA equips government with the mechanisms and ability to declare protected areas and determine how they may be managed and controlled.<sup>411</sup> A supplementary objective of the NEMPAA is the promotion of the sustainable use of protected areas in a way that would not encroach on the ecological character of such areas, which clarifies the protection of the environment.<sup>412</sup> The NEMPAA distinguishes between various types of protected areas<sup>413</sup> and holds that the system of protected areas is made up of special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments, as well as world heritage sites.<sup>414</sup> Furthermore, the system of protected areas may also include marine protected areas,

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<sup>407</sup> Section 37 of the NEMBA.

<sup>408</sup> Sections 38 and 39(1)(a) of the NEMBA.

<sup>409</sup> Sections 39(1)(c) and 39(2) of the NEMBA.

<sup>410</sup> Sections 39(2), 45(c)(iii) and 48(2) of the NEMBA.

<sup>411</sup> Section 2(a)-(c) of the NEMPAA.

<sup>412</sup> Section 2(e) of the NEMPAA.

<sup>413</sup> Section 9 of the NEMPAA. All protected areas must be added to the Register of Protected Areas which indicates the type of protected area and any other relevant information – see s 10 of the NEMPAA.

<sup>414</sup> See s 13 of the NEMPAA.

which contribute to microclimate regulation of coastal cities,<sup>415</sup> especially protected forest areas<sup>416</sup> which assist in temperature regulation of nearby urban areas, and mountain catchment areas of which numerous urban areas rely on for the provision of their basic water needs and microclimate regulation benefits.<sup>417</sup> Many of the areas that may be, or are declared as protected areas can contribute to ecosystem service delivery and microclimate regulation in cities.<sup>418</sup> Protected areas help to effectuate the protection of "viable areas representative of [biodiversity and natural land- and seascapes] in a system of protected areas" and to preserve the ecological integrity and biodiversity in such protected areas.<sup>419</sup> Furthermore, the goal of declaring protected areas is to preserve indigenous ecosystems, habitats and species as well as threatened species and vulnerable or ecologically sensitive areas, which also occur in urban ecosystems.<sup>420</sup> In relation to the protection of microclimate regulation services in the urban context, protected areas may additionally be established. The aim is to achieve the sustained supply of ecological goods and services and sustainable use of natural and biological resources in cities to the benefit of current and future urbanites.<sup>421</sup> The rehabilitation and restoration of degraded ecosystems and recovery of endangered and vulnerable species are also included in this list of objectives to be achieved through the declaration of protected areas.<sup>422</sup> However, there are restrictions on declaring protected areas, which can be seen in the provision on declaring an area as a special nature reserve. Such declaration may only be done in order "to protect highly sensitive, outstanding ecosystems, species, geological or physical features of an area."<sup>423</sup> Areas with significant natural features or biodiversity which are of scientific, cultural, historical or archaeological interest or need long-term protection for the maintenance of its biodiversity or the provision of environmental goods and services, may be declared as nature reserves.<sup>424</sup> Protected areas are also declared in

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<sup>415</sup> See s 14 of the NEMPAA.

<sup>416</sup> Section 15 of the NEMPAA. See also para 2.4 above.

<sup>417</sup> Section 16 of the NEMPAA.

<sup>418</sup> See para 2.3 above.

<sup>419</sup> Sections 17(a)-(c) of the NEMPAA.

<sup>420</sup> Sections 17(d)-(f) of the NEMPAA. See also para 2.3.1 above.

<sup>421</sup> Sections 17(g) and (h) of the NEMPAA. See also para 2.4 above.

<sup>422</sup> Section 17(l) of the NEMPAA.

<sup>423</sup> Section 18(2)(a) of the NEMPAA.

<sup>424</sup> Section 23(2)(b) of the NEMPAA.

cities when urban municipalities initiate a process for an area falling within the jurisdiction of the municipality.<sup>425</sup> Municipalities may be designated as the management authority of such areas.<sup>426</sup> Examples of such urban or local protected areas are prevalent in the City of Cape Town's extensive range of protected areas. These are, among others, the False Bay Ecology Park, Bracken Nature Reserve, and the Rietvlei Wetland Reserve.<sup>427</sup>

The NEMPAA provides for the declaration of an area as a protected environment in terms of section 28.<sup>428</sup> Protected environments may arguably be established in urban areas for purposes of regulating an area as a buffer zone for the conservation and protection of a protected area. The declaration of such protected environments in cities also enables the municipality to take action to conserve biodiversity on its land. In addition, it protects the area if it is sensitive to development due to its biological diversity; natural characteristics; scientific, cultural, historical, archaeological or geological value; or scenic and landscape value. More importantly, it protects areas that provide environmental goods and services and guarantee sustainable use of natural resources in the municipality.<sup>429</sup> The discussion in this part illuminates the possibility of utilising the mandate granted in the NEMPAA to declare areas as protected areas, as one of many measures that local governments may use to realise protection of the environment and its components in its jurisdiction. It is further noteworthy that not only may ecologically sensitive areas be declared protected areas, but threatened and vulnerable urban ecosystems may also be listed as threatened or vulnerable in terms of the NEMBA. This leads to the establishment of pollution priority areas.<sup>430</sup> Ecosystems that may be listed are confined to critically endangered,<sup>431</sup>

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<sup>425</sup> Paterson "Biodiversity" 748; s 35(1) of the NEMPAA.

<sup>426</sup> See also s 38(1)(a) of the NEMPAA regarding the assignment of the management authority of protected areas that may be assigned to an organ of state, which includes a municipality.

<sup>427</sup> Anonymous date unknown <https://bit.ly/3mk8Ibx>. The City of Tshwane have numerous urban protected areas such as the Pierre van Ryneveld Nature Area, Klapperkop Nature Reserve, and the Rietvlei Nature Reserve – see City of Tshwane 2015 <https://bit.ly/37naxhD>.

<sup>428</sup> Section 28(2) of the NEMPAA.

<sup>429</sup> Section 28(2) of the NEMPAA.

<sup>430</sup> The same notion applies to listing of threatened or at-risk species – see s 56 of the NEMBA.

<sup>431</sup> These are typically ecosystems that have suffered "severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high-risk irreversible transformation" – see s 52(2)(a) of the NEMBA.

endangered,<sup>432</sup> vulnerable,<sup>433</sup> and protected ecosystems.<sup>434</sup> The biodiversity, conservation, and control of the use of biological resources in protected areas and the declaration of protected areas in closer proximity to cities can profoundly contribute to the protection of ecosystems. In addition, they contribute to the conservation of natural resources which provide ecosystem services and can in turn help to combat the environmental issues that cities face.<sup>435</sup>

### 3.2.2 Planning Instruments

Development and planning are critical for sustainable development.<sup>436</sup> The incorporation of environmental factors into development plans, programmes and projects at the local government level are necessary to ensure that preservation of resources and conservation is taken into account during planning decisions. Given the intertwined nature of development, planning, and the environment, it is necessary to consider the instruments provided for by law and policy. It is further necessary to determine whether these instruments hinder or enable the protection of microclimate regulation services. Planning is essentially about determining what the land in urban areas may be used for as well as prescriptions on how it may be used.<sup>437</sup> Van Wyk<sup>438</sup> holds that land is central to both planning and environmental management. The author further maintains that land use planning may potentially infringe on the constitutional right to property in section 25 of the Constitution.<sup>439</sup> However, the infringement of this right to property might qualify as justifiable if compensation is paid for the expropriation of such land in the public interest or for a public purpose.<sup>440</sup> The

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<sup>432</sup> Endangered ecosystems entail "ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention" but not to such an extent that they may be considered critical – see s 52(2)(b) of the NEMBA.

<sup>433</sup> Vulnerable ecosystems denote ecosystems that have "a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention", yet not to a level of endangered or critically endangered – see s 52(2)(c) of the NEMBA.

<sup>434</sup> Protected ecosystems are taken to mean " ecosystems that are of high conservation value or of high national or provincial importance" but do not qualify as either vulnerable, endangered, or critically endangered – see s 52(2)(d) of the NEMBA.

<sup>435</sup> IUCN *Parks: Cities and Protected Areas 2*; Davies *et al* "Biodiversity and Health: Implications for Conservation" 286-287.

<sup>436</sup> Van Wyk "The Law on Planning and the Environment" 1134.

<sup>437</sup> Van Wyk "The Law on Planning and the Environment" 1134.

<sup>438</sup> Van Wyk "The Law on Planning and the Environment" 1134, 1138.

<sup>439</sup> Van Wyk "The Law on Planning and the Environment" 1138.

<sup>440</sup> Van Wyk "The Law on Planning and the Environment" 1138.

limitation of this right must also meet the justification criteria of the limitation clause in section 36 of the Constitution. Decisions in terms of land use change are also subject to administrative justice.<sup>441</sup>

This part of the study is rooted in the developmental mandates credited to the different spheres of government in terms of the Constitution and the schedules contained therein as well as in the planning law framework.<sup>442</sup> The Constitution demarcates the legislative competencies of the different spheres of government in relation to planning. It explicitly assigns "regional planning and development" as well as "rural and urban development" to the national and provincial spheres concomitantly.<sup>443</sup> Local government has exclusive competence to legislate on municipal planning.<sup>444</sup> The use of an integrated approach to land use and development can significantly assist in providing protection for the environment and ecosystems by way of cooperative governance and sector inputs from all government departments.<sup>445</sup> An integrated approach to land use and development (through planning) can significantly contribute to the eradication of the silo-based functioning of government departments. It can also lead to the delineation of functions across the board, ensuring better planning that considers and balances the social, economic, and environmental interests without one interest taking precedence over another.<sup>446</sup>

In light of spatial disparities of the past and the movement towards a more inclusive and sustainable future, important decisions need to be made by governments in respect of land use changes.<sup>447</sup> This end is achieved through land use management and the formulation and implementation of land use management schemes or town planning schemes that determine how the land in an area may be utilised. The setting forth of such differentiated purposes needs to be in a way that is reasonable and does

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<sup>441</sup> See para 3.3 below for a discussion on just administrative action and the requirements that need to be met.

<sup>442</sup> See schedules 4A and 4B, as well as 5A and 5B of the Constitution.

<sup>443</sup> Schedule 4A of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 13. See also para 1.1 above.

<sup>444</sup> Schedule 4B of the Constitution.

<sup>445</sup> See ss 7(e)(i) and (ii) of the SPLUMA.

<sup>446</sup> See Nel, Du Plessis and Retief "Key Elements for Municipal Action" 50-52. See also the discussion on co-operative governance in para 3.1 above.

<sup>447</sup> Retief and Cilliers "Land-use Management and Planning" 564.

not unreasonably contravene rights of people, as was done in the past.<sup>448</sup> These schemes may be developed to include environmental management tools such as strategic environmental assessment (SEA), environmental management frameworks, and conservation planning.<sup>449</sup> Planning instruments arguably play an important role in the protection of microclimate regulation services in cities, as microclimates are influenced by the infrastructural layout of the city as well as the materials used.<sup>450</sup> Therefore, land use and layout of city infrastructure and green infrastructure need to be well thought out and sufficient consideration should be given to the environmental concerns raised as a failure to do so may contribute to the heat island effect and related problems that cities experience.

The primary source of municipal planning law is the SPLUMA which establishes a land use planning system that aims to be protective of the environment,<sup>451</sup> and provides for the sustainable and efficient use of the land.<sup>452</sup> Integrated development planning consists of strategic and spatial planning.

### 3.2.2.1 Strategic Planning Instruments

Strategic spatial planning revolves around the identification of key issue areas; determining a type of "swot" analysis concerning the environment; determining any external trends, forces and resources; allowing for diverse involvement in the planning process; and develops a long-term vision, plans and strategies concerning spatial change.<sup>453</sup> It also focuses on decisions, actions, and implementation of plans in respect of specific aspects fundamental to the overall achievement of the development

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<sup>448</sup> Retief and Cilliers "Land-use Management and Planning" 563. See also para 3.2.2.2.2 below.

<sup>449</sup> Retief and Cilliers "Land-use Management and Planning" 575.

<sup>450</sup> See para 2.4 above.

<sup>451</sup> See the preamble of the SPLUMA.

<sup>452</sup> Section 3(d) of the SPLUMA.

<sup>453</sup> Albrechts 2004 *Environment and Planning B: Planning and Design* 747. A good example of this can be found in the South African policy framework via the *Biodiversity Economy Strategy (BES) for the Department of Environmental Affairs* set out in GN 965 in GG 39268 of 9 October 2015 as it provides a clear explanation to strategic planning. It states that: "Strategic planning starts with an assessment of the status quo, complemented by appropriate medium- and long-term goal-setting. Thereafter, the strategic plan determines the transformation enabling interventions required to achieve these goals, and to mobilise the available resources to execute the required actions. A smart strategic plan therefore sets appropriate risk minimising development goals, intermediate objectives, time-frames and roles and responsibilities, all of which can be monitored for progress. But it does this with a view to identify and auction strategic leverage points."

objectives in terms of the mandates of the different spheres of government as set out in SPLUMA.<sup>454</sup> It is argued that strategic spatial planning assists local governments to determine prevalent and probable challenges in city spaces and helps them design and implement strategies and plans to take action against such challenges to achieve the development objectives that they set out to achieve.<sup>455</sup> The primary instruments for integrated development planning that is inclusive of environmental considerations are integrated development plans (IDPs). IDPs are imperative strategic planning instruments and should serve as guidelines for planning and development in municipalities.<sup>456</sup> They form part of the planning and formal legal requirements that must be incorporated and complied with by the local government sphere in the exercise of their executive and legislative authority.

Any decisions related to planning, management, and development in municipalities are informed by the municipality's IDP.<sup>457</sup> The IDP is a strategic spatial planning instrument. It is the instrument in which the development vision of a municipality is set forth, along with the municipal plans, priorities, objectives, development strategies, frameworks, and sector management plans that are required by the SEMAs as previously discussed.<sup>458</sup> The IDP is geared towards promoting sustainable development. It contains sustainable development undertones as it encompasses an agglomeration of specific environmental management plans as provided for by the different SEMAs<sup>459</sup> aimed at realising environmental protection among the social and economic interests of development.<sup>460</sup>

The Climate Change White Paper further highlights integrated planning as one of the strategic priorities in respect of South Africa's climate change response strategy. The strategy aims to prioritise the mainstreaming of climate change considerations and responses into all relevant sector, national, provincial and local planning regimes,

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<sup>454</sup> Albrechts 2004 *Environment and Planning B: Planning and Design* 747. See also Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 135.

<sup>455</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 136.

<sup>456</sup> Section 35(1)(a) of the MSA. See also Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 158.

<sup>457</sup> Section 35(1)(a) of the MSA.

<sup>458</sup> See s 26 of the MSA in relation to additional core components of an IDP.

<sup>459</sup> See para 3.3 above.

<sup>460</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 231.

inclusive of IDPs.<sup>461</sup> Moreover, the *Draft Climate Change Bill* (2018) envisions that municipalities develop and implement an integrated climate change response implementation plan that informs development planning processes and instruments. It also provides that persons who receive carbon budgets are obliged to implement a greenhouse gas mitigation plan describing the mitigation actions it plans to take to comply with the carbon budget, which will also have to be included in the municipal planning framework.<sup>462</sup> The implementation of these plans will contribute to combatting climate change and the emission of GHG in urban areas which disturbs ecosystem capability in relation to microclimate regulation services.<sup>463</sup>

The National Water and Sanitation Master Plan Volume 1: Call to Action<sup>464</sup> emphasises the under-realisation of ecological infrastructure and its poor incorporation into the planning and construction of (urban) built infrastructure. As dominant providers of ecosystem services and benefits, the NW&SMP regards incorporation of such infrastructure as important for planning to achieve the protection and restoration of the ecological infrastructure.<sup>465</sup>

### 3.2.2.2 Spatial Planning Instruments

#### 3.2.2.2.1 Spatial Development Frameworks

SPLUMA makes provision for spatial development frameworks (SDFs) at all spheres of government, meaning that SDFs should be drafted at the national, provincial, regional, and local government levels.<sup>466</sup> The SPLUMA allocates the duty of compiling, publishing and reviewing the national SDF to the Minister. This national SDF must take cognisance of any policies, plans and programmes that impact on spatial planning, land development and land use management as well as matters relevant to the

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<sup>461</sup> Item 4.2 of the Climate Change White Paper.

<sup>462</sup> Items 9(1)(b), 9(5) and 13(7) in GN 580 in GG 41689 of 8 June 2018 (hereafter the Draft Climate Change Bill).

<sup>463</sup> See para 2.4 above.

<sup>464</sup> Department Water and Sanitation *National Water and Sanitation Master Plan Volume 1: Call to Action* 11, 34-35 (hereafter the NW&SMP).

<sup>465</sup> Item 8 of the NW&SMP.

<sup>466</sup> See ss 13-21 of the SPLUMA.

coordination thereof,<sup>467</sup> including any applicable environmental management instruments.<sup>468</sup> Furthermore, the national SDF is intended to realise the developmental principles as well as norms and standards.<sup>469</sup> It gives effect to relevant policies, priorities, plans and legislation.<sup>470</sup> It also enhances the spatial coordination of land development and land use management activities at the national level;<sup>471</sup> indicates the desired patterns of land use in the Republic;<sup>472</sup> as well as coordinates and integrates provincial and municipal SDFs.<sup>473</sup>

At the provincial level, the duty to compile, determine and publish a provincial SDF is situated with the provincial sphere of government.<sup>474</sup> Likewise, the duty to adopt a municipal SDF lays with the Municipal Council at the local level.<sup>475</sup> Provincial SDFs must include spatial representations of the land development policies, strategies and objectives;<sup>476</sup> and an indication of the desired and intended pattern of land use development.<sup>477</sup> They must also include coordination and integration of the spatial expression of the sectoral plans of provincial departments;<sup>478</sup> and set out a framework for coordinating municipal SDFs.<sup>479</sup> Furthermore, the provincial SDF must ensure coordination of municipal SDFs with the provincial SDF and any regional SDFs;<sup>480</sup> and must incorporate any spatial aspects of relevant national development strategies and programmes.<sup>481</sup> As far as municipal and regional SDFs are concerned, it is pertinent that they give effect to the development principles, norms and standards, as well as national and provincial policies, plans, etc.<sup>482</sup> Since the SPLUMA makes provision for the inclusion of environmental pressures and opportunities as well as the locations of

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<sup>467</sup> Sections 13(3)(a) and (b) of the SPLUMA.

<sup>468</sup> Section 14(f) of the SPLUMA.

<sup>469</sup> Section 14(a) of the SPLUMA.

<sup>470</sup> Section 14(b) of the SPLUMA.

<sup>471</sup> Section 14(d) of the SPLUMA.

<sup>472</sup> Section 14(e) of the SPLUMA.

<sup>473</sup> Section 14(c) of the SPLUMA.

<sup>474</sup> Section 15 of the SPLUMA.

<sup>475</sup> Section 20 of the SPLUMA.

<sup>476</sup> Section 16(a) of the SPLUMA.

<sup>477</sup> Section 16(b) of the SPLUMA.

<sup>478</sup> Section 16(c) of the SPLUMA.

<sup>479</sup> Section 16(d) of the SPLUMA.

<sup>480</sup> Section 16(e) of the SPLUMA.

<sup>481</sup> Section 16(f) of the SPLUMA.

<sup>482</sup> See ss 19 and 21 of the SPLUMA. See also para 4.3 below for further discussion with regards to municipal SDFs.

environmental sensitivities, it can be deduced that these frameworks contribute to the protection of the environment and its components. Such planning instruments may be used to indicate areas of vulnerability in cities that are not viable for development as is done in the City of Johannesburg's SDF.<sup>483</sup> These areas can then be highlighted as areas to be zoned for conservation purposes in the cities.<sup>484</sup> Several cities make provision for environment-related improvements and responses to specific climate change that affects the city at a local level and may contribute to lower urban temperatures and the protection of microclimate regulation services.<sup>485</sup> Even though SDFs set out several aspects in relation to the management and development of the land, it cannot grant a person rights to develop or use the land as such a right can only be bestowed upon a person by way of a land use scheme.<sup>486</sup>

#### 3.2.2.2.2 Land Use Schemes

The purpose of a land use scheme (LUS) is to determine the use and development of land within the municipal area.<sup>487</sup> A LUS sets out the appropriate categories of land use zoning and regulations in a municipal area.<sup>488</sup> Furthermore, the LUS needs to be adopted in such a manner that it will not conflict with any environmental management instruments or legislation.<sup>489</sup> Other important features of the LUS include scheme regulations; zoning maps, and a register of amendments.<sup>490</sup> The LUS is a binding legal instrument which may be enforced in terms of section 32 of the SPLUMA.<sup>491</sup> Zoning is an important mechanism to include in the LUS as it is in principle, what land use regulation and management are concerned with. Zoning has several benefits, among

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<sup>483</sup> City of Johannesburg: Department of Development Planning *City of Johannesburg Metropolitan Municipality Spatial Development Framework 2040* 88.

<sup>484</sup> See para 3.2.2.2.2 below.

<sup>485</sup> See para 3.2.2.2.2 below.

<sup>486</sup> See s 17(3) of the SPLUMA as an example. See also Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 237.

<sup>487</sup> Section 25(1) of the SPLUMA.

<sup>488</sup> Section 24(2)(a) of the SPLUMA.

<sup>489</sup> Section 24(2)(b) of the SPLUMA.

<sup>490</sup> Section 25(2) of the SPLUMA.

<sup>491</sup> See s 26 of the SPLUMA regarding the legal effect of the LUS. See also s 32 regarding enforcement of the LUS, which determines that a "municipality may apply to a court for an order interdicting any person from using land in contravention of its land use scheme; authorising the demolition of any structure erected on land in contravention of its land use scheme, without any obligation on the municipality or the person carrying out the demolition to pay compensation; or directing any other appropriate preventative or remedial measure" – s 32(2) of the SPLUMA.

which are the protection of public health, safety, welfare, and conservation.<sup>492</sup> Zoning may be used to landmark areas in cities in which specified uses and activities are either permitted or prohibited.<sup>493</sup> The SPLUMA identifies several purposes for which land may be used. Purposes include the use of land for commercial, community, conservation, educational, government, industrial, institutional, mining, public, recreational, residential, and transport purposes.<sup>494</sup> Should land be used contrary to its stipulated purpose in the LUS or zoning scheme, it will lead to frustration in the exercise and objectives of local governments in relation to their planning and environmental protection mandates in circumstances where the purpose of the land-use was conservation.<sup>495</sup> The zoning of threatened areas or "environmental zones" in cities for conservation purposes contributes to the protection of the environment and resultantly to the protection of microclimate regulation services provided by ecosystems within the urban environment.<sup>496</sup> It increases the ecosystems' chances of maintaining its capacity for the delivery of microclimate regulation services. An example of the importance of zoning is found in the Climate Change White Paper, which regulates that people must

ensure that land-use zoning regulations are enforced and that urban land-use planning considers the impacts of climate change and the need to sustain ecosystem services when considering settlements and infrastructure development proposal.<sup>497</sup>

The foregoing is an important consideration in decision-making regarding settlement and infrastructure development in cities, as these activities can have severe effects on the environment and its components and potentially influence city microclimates, if implemented incorrectly.

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<sup>492</sup> Van Wyk "The Law on Planning and the Environment" 1144.

<sup>493</sup> Van Wyk "The Law on Planning and the Environment" 1144.

<sup>494</sup> Schedule 2(1) of the SPLUMA.

<sup>495</sup> Van Wyk "The Law on Planning and the Environment" 1145.

<sup>496</sup> This inclusion of environmental zones and conservation areas, along with environmental considerations, is evident in, for example, the City of Johannesburg *Land Use Scheme, 2018* 88-89.

<sup>497</sup> Item 5.6.6 of the Climate Change White Paper.

### 3.2.3 Integrated Environmental Management Instruments

#### 3.2.3.1 Environmental Management Plans, Frameworks and Programmes

NEMA ascribes the preparation of environmental implementation plans to national departments whose functions might affect the environment and provincial departments responsible for environmental affairs.<sup>498</sup> When a national department's functions include managing the environment, they are additionally required to draft an environmental management plan.<sup>499</sup> When preparing their environmental implementation and management plans, national and provincial departments are required to include, for example, an air quality management plan.<sup>500</sup> They may also include an "assembly of information or plans compiled for other purposes"<sup>501</sup> such as the national biodiversity framework,<sup>502</sup> bioregional plans,<sup>503</sup> biodiversity management plans,<sup>504</sup> coastal management concerns and objectives,<sup>505</sup> management plans for protected areas,<sup>506</sup> and integrated waste management plans.<sup>507</sup> In light of the discussion regarding bioregions earlier, it is permissible that these provisions extend to local governments in their environmental protection mandate, which allows for the establishment of bioregions in urban areas subject to their jurisdiction, and the implementation and management of such areas through management and bioregional plans.<sup>508</sup> If these provisions are applied to local governments, this would significantly contribute to their conservation efforts for micro-climate regulation since they can draft and implement management plans for other environmental disparities to be addressed in urban areas.

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<sup>498</sup> Section 11(1) of NEMA. This includes the department that is in control of environmental affairs.

<sup>499</sup> Section 11(2) of NEMA. This may be consolidated with the environmental implementation plan according to s 11(3) of NEMA.

<sup>500</sup> Section 15(1) of NEMAQA.

<sup>501</sup> Section 11(7) of NEMA.

<sup>502</sup> Section 39 of NEMBA.

<sup>503</sup> Section 40(b) of NEMBA.

<sup>504</sup> Section 43 of NEMBA.

<sup>505</sup> Section 35(3)(b) of NEMICMA.

<sup>506</sup> Section 41(1) and (2) of NEMPAA.

<sup>507</sup> Section 11 and 12 of NEMWA.

<sup>508</sup> See para 3.2.1.2 above. See also s 39 and 41 of NEMBA.

These implementation and management plans are meant to be drafted with the intent of advancing the "coordination and harmonisation of environmental policies, plans, programmes and decisions" of the functionaries at national, provincial and local governments responsible for "achieving, promoting and protecting a sustainable environment".<sup>509</sup> The principal aim of coordinating the plans, policies and programmes is to "minimise duplication" and "promote consistency" of functions and procedures at the different spheres of government.<sup>510</sup> These plans also contribute to the achievement of co-operative governance, as envisioned by the Constitution, as it brings various departments and spheres of government together to ensure alignment of their policies, plans and programmes to meet the ends of non-duplication, eradicating fragmentation and fostering consistency.<sup>511</sup> Organs of state required to draft such plans must take into account any implementation or management plans already adopted.<sup>512</sup> For this reason, it is indispensable that provincial departments take into account the implementation and management plans already adopted by national departments. Furthermore, provincial departments must ensure compliance with the applicable environmental implementation and management plans by the local sphere of government in its jurisdiction.<sup>513</sup> Moreover, local governments must take into account and comply with the implementation and management plans as well as the section 2 NEMA principles in the drafting of policies, plans and programmes such as, the IDPs that municipalities are required to draft.<sup>514</sup> These plans, policies and programmes form a crucial part of the planning instruments that local governments must use in decision-making procedures regarding planning and development to ensure environmental protection.

In addition to the consideration and compliance with national and provincial implementation and management plans, some of the SEMAs also require municipalities to draft and include specific sector management plans, frameworks, programmes or

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<sup>509</sup> Section 12(a) of NEMA.

<sup>510</sup> Section 12(a)(i) and (ii) of NEMA.

<sup>511</sup> Section 12(b) of NEMA.

<sup>512</sup> Section 11(4) of NEMA.

<sup>513</sup> Section 16(4) of NEMA.

<sup>514</sup> Section 16(4)(b) of NEMA. IDPs are to be drafted in terms of s 25 of the MSA – See para 4.3 below in this regard.

assessments in their IDPs.<sup>515</sup> Municipalities are also obliged to report on the implementation of such management plans annually.<sup>516</sup> NEMA goes further to state that one of the objectives of these plans is to "secure the protection of the environment across the country as a whole",<sup>517</sup> through which the inclusion of ecosystems and their services into such implementation and management plans can be construed. Another goal highlighted in section 12 of NEMA is the attainment and advancement of a sustainable environment without causing any adverse effects on the economic and health interests in the country.<sup>518</sup> With regard to plans, the *National Climate Change Adaptation Strategy* (2019) holds that since the development of the *National Climate Change Response Policy* (2011), the development of adaptation policies, plans and strategies have increased, and this includes progress made in terms of climate adaptation plans in local government (i.e. at the city level where the heat island effect is problematic).<sup>519</sup>

An alternative but relevant environmental management instrument that can advance environmental and ecosystem services protection is environmental management frameworks. While NEMA mentions environmental management frameworks as part of the prescribed environmental management instruments, it does not further elaborate on their relevance or implementation. Despite the lack of clarity in NEMA, several of the SEMAs make provision for environmental management frameworks. In NEMAQA, this takes the form of a national framework which contains "mechanisms, systems and procedures" as well as norms and standards to achieve environmental protection through improving air quality, preventing pollution and ecological degradation, as well as promoting sustainable development.<sup>520</sup> In a similar vein, the NEMBA makes provision for a national biodiversity framework which must "provide for

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<sup>515</sup> An example of this can be seen in NEMAQA which requires that municipalities include an air quality management plan in their IDPs in order to improve the poor air quality in South African cities caused by the use of fossil fuels, industrial emissions and other point, non-point and mobile emissions - Sections 15(2) and 16(1) of NEMAQA.

<sup>516</sup> Section 16(1)(b) of NEMA.

<sup>517</sup> Section 12(c) of NEMA.

<sup>518</sup> Sections 12(d) and (e) of NEMA.

<sup>519</sup> Department Environment, Forestry and Fisheries *National Climate Change Adaptation Strategy* 14.

<sup>520</sup> Sections 2 and 7 of NEMAQA. The norms and standards pertain to "the control of emissions from point and non-point sources; ... air quality monitoring; ... air quality management planning, [and] ... air quality information management." – see s 7(1)(c)-(f) of NEMAQA.

an integrated, coordinated and uniform approach to biodiversity management".<sup>521</sup> Even though the NEMICMA, NEMPAA, NEMWA, NWA, and WSA do not explicitly provide for specific frameworks in the respective acts, they do allow for such frameworks to be established through policy. The Climate Change White Paper states that the *Water for Growth and Development Framework* (2009)<sup>522</sup> aims to achieve sustainable development by balancing the critical role of water as a fundamental human right and economic development.<sup>523</sup>

In addition to management plans and frameworks, environmental laws also contain established provisions for environmental management programmes. In terms of NEMA, the Minister or MEC as the case may be may require an applicant to submit an environmental management programme detailing any relevant information regarding the "management, mitigation, protection or remedial measures" proposed concerning environmental impact that may stem from the proposed activity.<sup>524</sup> This is also a requirement listed in NEMAQA, which determines that an applicant who conducted an unlawful listed activity resulting in atmospheric emission may be required to draft a report inclusive of an environmental management programme.<sup>525</sup> Provisions for the implementation and coordination of environmental management programmes for conservation efforts, ecosystem rehabilitation as well as the prevention, control and eradication of listed invasive species are recorded in NEMBA.<sup>526</sup>

In contrast with NEMA, NEMAQA, NEMBA and NEMWA which assign the responsibility for drafting, coordinating, and implementing an environmental management programme to applicants when conducting certain activities or to SANBI, NEMICMA takes a slightly different approach. NEMICMA requires coastal management programmes to be drafted by the different spheres of government and describes the

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<sup>521</sup> Sections 38 and 39 of NEMBA. Section 39 further holds that such framework must identify conservation priority areas and protected areas and it "may determine norms and standards for provincial and municipal environmental conservation plans."

<sup>522</sup> Department of Water Affairs and Forestry *Water for Growth and Development Framework* 36.

<sup>523</sup> Item 5.2 of the Climate Change White Paper.

<sup>524</sup> Section 24N of NEMA. See s 24N(2) for the extensive list of things that must be contained in such environmental management programme.

<sup>525</sup> Section 22A(4)(f)(v) of NEMAQA.

<sup>526</sup> Section 11(1)(m)-(n) of NEMBA. The implementation and coordination of such programmes in NEMBA is assigned specifically to SANBI as one of its functions.

requirements for the preparation, adoption and contents of such coastal management programmes for national, provincial and local government departments.<sup>527</sup> The coastal management programmes must be policy directives based at the different spheres of government setting out an integrated approach to the coastal management in the country and its provinces.<sup>528</sup> The WSA determines that an implementation programme must accompany the water services development plan of every water services authority as requires by section 12 of the WSA.<sup>529</sup> The provisions for the foregoing goes to show that environmental management programmes may also be required at a local government level within cities insofar as municipalities undertake certain activities in relation to the environment.

### 3.2.3.2 Environmental Authorisations

The use of environmental authorisations permits, and licenses can significantly assist government in the protection of microclimate regulation services. Applicants who wish to undertake development or conduct activities that may detrimentally affect the urban ecosystems that provide microclimate regulation services will need to obtain authorisations, licences or permits. Authorisations, permits and licenses can significantly assist local government in curbing the environmental threat to natural resources that provide microclimate regulation services, prevent over-exploitation of natural resources, and ensure the quality and quantity as well as the integrity of the ecosystems in their jurisdictions. Compliance with these instruments is essential, and in most cases, the law provides for the monitoring of the use of the awarded instrument.<sup>530</sup> Actions in contravention of the required authorisation may result in liability to pay a fine or imprisonment.<sup>531</sup> Additionally, such authorisation, licence or permit may be cancelled, suspended or revoked if the holder contravenes the

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<sup>527</sup> See ss 44-52 of NEMICMA. Any estuarine management plan must also be consistent with such programmes – See s 34 of NEMICMA.

<sup>528</sup> Sections 45(1)(a) and (b), 47(1)(a) and (b), and 49(1)(a) of NEMICMA.

<sup>529</sup> See ss 12 and 13 of the WSA. In terms of s 1 of the WSA, the "water services authority" refers to "any municipality, including a district or rural council ... responsible for ensuring access to water services."

<sup>530</sup> Monitoring can be done by a compliance officer, the relevant minister or catchment management agency - See in this regard s 59 of NEMBA; S 58 of NEMWA; s 2 of NWA.

<sup>531</sup> See ss 49A and 49B of NEMA; s 51 and 52 of NEMAQA; s 101(2)-(3) and 102 of NEMBA; ss 79(1)(e)-(j), 79(2)(f)-(g) and 80 of NEMICMA; ss 67(h) and 68 of NEMWA.

conditions or specifications of the applicable instrument or if their activity is causing severe harm to the environment or its components.<sup>532</sup>

Environmental authorisations may only be granted once the potential consequences and impact of listed activities on the environment are "considered, investigated, assessed and reported to the competent authority".<sup>533</sup> Listed activities may not take place without an environmental authorisation except in circumstances where it is exempted from needing an authorisation.<sup>534</sup> Before the onset of a proposed development or activity, a screening process must be initiated to determine whether an EIA is necessary.<sup>535</sup> Whether an activity requires a basic or comprehensive EIA is determined by the regulations on listed activities and depends on the listing notice in which it is promulgated.<sup>536</sup> The *Environmental Impact Assessment Regulations, 2014*,<sup>537</sup> clarifies the differences between a basic assessment and full EIA. It also states the application requirements for each case.<sup>538</sup> Both the basic and full assessments serve the purpose of considering and determining the cumulative impact of "geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites" where activities are proposed.<sup>539</sup> The EIA process has the possibility of contributing to the protection of ecosystems that provide microclimate regulation and

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<sup>532</sup> See ss 93 and 93B of NEMBA; s 56 of NEMWA; s 68 of NEMICMA; ss 54 and 55 of NWA.

<sup>533</sup> Section 24(1) of NEMA. The competent authority must be identified in terms of s 24C of NEMA which contains the procedure for identifying such authority. A "competent authority responsible for granting authorisations in respect of activities" must be identified by the Minister or MEC during the process of listing or specifying activities – S 24C(1) of NEMA. In some instances, such as where an activity has ramifications that affect international commitments; has a development footprint breaching the perimeter of one or more province or international boundaries; or will take place in a national protected area or conservation area managed by the national authority, the Minister will be identified as the competent authority (unless the Minister delegates this authority to the Director-General; an MEC; the management authority of a protected area; or any organ of state in terms of s 42(1))– see s 24C(2) of NEMA in this regard).

<sup>534</sup> See s 24(1) of NEMA.

<sup>535</sup> See Department of Environmental Affairs and Tourism (DEAT) *Overview of Integrated Environmental Management* 11.

<sup>536</sup> The three applicable listing notices are GN R983, R984, and R985. See GN R983 in GG 38282 of 4 December 2014, GN R984 in GG 38282 of 4 December 2014; GN R985 in GG 38282 of 4 December 2014. Activities that require basic assessments are listed in reg R983 and R985, while activities triggering a full EIA process are set out in regulation R984. See also para 3.3.5.2 below.

<sup>537</sup> GN R982 in GG 38282 of 4 December 2014.

<sup>538</sup> Regs 19-20 in GN R982 in GG 38282 of 4 December 2014 are applicable to basic assessments, whereas regs 21-24 are applicable in cases where activities trigger a full EIA assessment.

<sup>539</sup> See reg 2(d) of Appendix 1 and reg 2(c) of Appendix 3 to GN R982 in GG 38282 of 4 December 2014.

other ecosystem services as it requires the consideration of certain factors pertaining to the environment when developments and activities are proposed.<sup>540</sup> These factors pertain to measures protecting the environment from the potential harm of activities and the mitigation of pollution, detrimental impact and degradation.<sup>541</sup>

Retief and Cilliers<sup>542</sup> allude to the fact that EIA is a very effective environmental policy intervention, and that South Africa has a well-established EIA system. They also emphasise that EIAs need to consider the socio-economic and environmental aspects, which include ecosystem services, as mandated by the principles contained in NEMA.<sup>543</sup> Therefore, EIAs presuppose the contemplation of aspects of sustainable development and the balancing of the interests inherent thereto so as not to have one aspect overshadowed by another. EIAs have enjoyed the limelight in a few trademark cases in South Africa such as *Earthlife Africa Johannesburg v Minister of Environmental Affairs*. In this case, the court highlighted the importance of considering all factors as set out in section 24O of NEMA, including in this particular instance, the importance of considering a climate change impact assessment report.<sup>544</sup> Similarly, the Fuel Retailers-case stressed the importance of the sustainable development balance and the linkage between the environment, development and socio-economic development when considering environmental authorisation applications.<sup>545</sup> It also underscored the duty of the competent authority to consider all factors, including socio-economic aspects, when making decisions on applications for environmental authorisations.<sup>546</sup>

Much like EIAs, permits and licences are required in several provisions contained in sector-specific environmental laws. These instruments may take the form of, for instance, atmospheric emission licences as required by NEMAQA in which the licensing authority (municipalities) are obliged to consider any minimum standards for ambient air quality and emissions, the possibility of pollution, best practicable environmental

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<sup>540</sup> DEA *20 Years of Environment Impact Assessment in South Africa* 1; Du Plessis and Du Plessis "Striking the Sustainability Balance in South Africa" 447-448.

<sup>541</sup> Section 24O(1)(b)(i) as well as s 24O(1)(b)(ii)(aa) and (bb) of NEMA.

<sup>542</sup> Retief and Cilliers "Land-use Management and Planning" 582-583.

<sup>543</sup> Retief and Cilliers "Land-use Management and Planning" 584. See also s 2 of NEMA.

<sup>544</sup> *Earthlife Africa Johannesburg v Minister of Environmental Affairs* 2017 2 All SA 519 (GP) para 5.

<sup>545</sup> Fuel Retailers-case paras 44-45.

<sup>546</sup> Fuel Retailers-case paras 71-72, 75, 75, 79, 82, and 89.

options, the environmental authorisation and outcome thereof (if one was done), among others.<sup>547</sup> In contrast, NEMBA, contains extensive provisions regarding permits for bioprospecting, restricted activities concerning listed threatened and protected species, as well as alien, invasive or genetically modified species.<sup>548</sup> Similarly, NEMICMA sets out the requirements for coastal use permits<sup>549</sup> and dumping permits.<sup>550</sup> In addition to these laws, the WSA demands that water boards must acquire a permit, authorisation or licence for the extraction of water and discharge of any effluent.<sup>551</sup>

Environmental authorisations, permits and licenses may require municipalities to comply with certain conditions set out in the national and provincial legislative framework if they want to conduct certain activities that fall within their competence.<sup>552</sup> Without the relevant authorisations, municipalities will be hindered in the performance of their duties as far as it pertains to such activities (for example, the undertaking of waste management activities in terms of the NEMWA). Nevertheless, municipalities may also in some instances be required to use environmental authorisations, permits and licenses to regulate the behaviour of their constituents in respect of certain activities to ensure environmental protection in their demarcated urban areas.<sup>553</sup> An example of this can be found in NEMAQA where municipalities are charged with implementing atmospheric emission licensing systems, and must perform the functions of a licensing authority in this regard.<sup>554</sup>

### *3.2.4 Voluntary Contractual Arrangements*

Another instrument available to the different spheres of government that may assist them in realising the protection of ecosystem services is voluntary contractual

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<sup>547</sup> Section 39 of NEMAQA.

<sup>548</sup> See s 87 of the NEMBA.

<sup>549</sup> See ss 65-66 and 69 of NEMICMA.

<sup>550</sup> See s 71 of NEMICMA.

<sup>551</sup> Section 32(e) of the WSA.

<sup>552</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 102-105.

<sup>553</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 124-125.

<sup>554</sup> Sections 39-48 of NEMAQA.

arrangements in the form of public-private partnerships (PPPs) between government departments and external private service providers.<sup>555</sup> PPPs refer to:

a commercial transaction between an institution and a private party in terms of which the private party –

- (a) performs an institutional function on behalf of the institution; and / or
- (b) acquires the use of state property for its own commercial purposes; and
- (c) assumes substantial financial, technical and operational risks in connection with the performance of the institutional function and/or use of state property; and
- (d) receives a benefit for performing the institutional function or from utilising the state property, either by way of:
  - (i) consideration to be paid by the institution which derives from a revenue fund or, where the institution is a national government business enterprise or a provincial government business enterprise, from the revenues of such institution; or
  - (ii) charges or fees to be collected by the private party from users or customers of a service provided to them; or
  - (iii) a combination of such consideration and such charges or fees.<sup>556</sup>

PPPs establish a relationship between the private sector and state organs in which governments and their governance methods are acquainted with private sector resources and expertise, and where private sector actors assist government in the delivery of services or provide them with assets.<sup>557</sup> This instrument paves the way for private entities to participate in the governance activities of government and may be utilised for, among others, environmental governance. Private parties can participate in governance through the performance of a government function, management or use of government property, and undertaking some of the risk related to government functions.<sup>558</sup> Generally, PPPs are used to exact service delivery mandates of government such as water and energy provision, among others.<sup>559</sup> Private parties in such PPPs receive compensation for the functions they perform.<sup>560</sup> Examples of service delivery type PPPs are found in the several agreements of the Water and Sanitation Services South Africa (WSSA) with certain

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<sup>555</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 41.

<sup>556</sup> Reg16(1) in GN R225 in GG 27388 of 15 March 2005.

<sup>557</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 42.

<sup>558</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 154.

<sup>559</sup> Ramayia *The Environmental Outcomes of Public-private Partnerships (PPP): The Case of the Durban Beachfront* 12.

<sup>560</sup> See reg 16(1)(d) in GN R225 in GG 27388 of 15 March 2005.

local governments in South Africa<sup>561</sup> as well as Silulumanzi, a water and wastewater services provider of Mbombela.<sup>562</sup> To this end, the WSSA provides water abstraction, purification, distribution, wastewater collection and treatment services, as well as management, maintenance and operation of water and sewage systems to several areas in South Africa such as Queenstown (Komani) in the Chris Hani District Municipality, uThungulu District Municipality, and the City of Johannesburg, amongst others.<sup>563</sup>

The utilisation of PPPs holds several benefits such as, *inter alia*, the capacity and expertise of the private sector to attend to service delivery mandates and ultimately improving service delivery, exposure to innovative solutions for service delivery shortfalls, education and training in the methods used so that after the PPP ends the use of the methods may sustainably continue, utilisation of specialist equipment, the possibility of additional income charged by the private body for the services if there is an agreement to share such income, and fixed long-term planning and budgets.<sup>564</sup> Despite allowing a public body to take over or perform the function of government, it is stressed that the government department or organ of state, as the case may be, remains responsible for its duties and to ensure that its duties are met.<sup>565</sup> In other words, the public sector cannot be expected to bear the responsibilities and liabilities of the government. In the context of ecosystem services, PPPs may be used by the government to facilitate ecosystem protection and conservation in urban areas. This may be achieved by requiring the private party in the PPP to undertake environmental functions or duties of the municipality, such as ecosystem restoration and conservation, which will improve the state of ecosystems affected by developments in the city that have a detrimental impact on the environment and resultantly enhance its capacity to

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<sup>561</sup> See WSSA 2016 <http://www.wssa.co.za/>.

<sup>562</sup> Silulumanzi 2020 <https://www.silulumanzi.com/home>.

<sup>563</sup> National Business Initiative (NBI) 2017 <https://www.nbi.org.za/wp-content/uploads/2019/05/Mathias-Esmann-Volutas-Public-Private-Partnerships-in-SA.pdf> 12-13.

<sup>564</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 54-55.

<sup>565</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 47.

deliver ecosystem services.<sup>566</sup> An example of such a PPP was investigated by Ramayia<sup>567</sup> and pertained to a revitalisation project in the eThekweni municipality that aimed to revitalise the Durban beachfront. This example concerns an agreement between the eThekweni Municipality and the Suncoast Casino and Entertainment World in which the municipality permitted the casino to use part of the beachfront for a sundeck and this led to the partial destruction of the dune and dune vegetation.<sup>568</sup> In return, the casino undertook to rehabilitate the dunes and restore the dune vegetation that was affected in the development of the casino to a greater extent than its previous condition.<sup>569</sup> Another example is found in the 2019 budget review of Treasury under completed PPPs and pertains to the creation of the Western Cape Nature Conservation Board (CapeNature) that has the responsibility to "promote and ensure nature conservation; render services and provide facilities for research and training; and generate income" in the Western Cape and their involvement with private entities such as the De Hoop Collection.<sup>570</sup> In addition to these examples, the Working for Wetlands programme, which is aimed at wetland conservation and rehabilitation, is also based on PPP agreements between government departments, private entities, corporate partners and other stakeholders such as the Worldwide Fund for Nature (WWF).<sup>571</sup> These examples illustrate that PPPs can be utilised to effectuate the conservation and protection of ecosystems. It is therefore debatable that PPPs may be used by

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<sup>566</sup> Ramayia *The Environmental Outcomes of Public-private Partnerships (PPP): The Case of the Durban Beachfront* 12.

<sup>567</sup> Ramayia *The Environmental Outcomes of Public-private Partnerships (PPP): The Case of the Durban Beachfront*.

<sup>568</sup> Ramayia *The Environmental Outcomes of Public-private Partnerships (PPP): The Case of the Durban Beachfront* 45. This example might not qualify as a PPP in the strict sense, due to the destruction caused by the casino and subsequent remedying of the damage caused, but there was still an agreement between the casino and the municipality for the use of the municipal property and the performance of a municipal function in the rehabilitation of the dunes done by the casino. This example may therefore qualify as more of a hybrid-type PPP.

<sup>569</sup> Ramayia *The Environmental Outcomes of Public-private Partnerships (PPP): The Case of the Durban Beachfront* 47.

<sup>570</sup> National Treasury *Budget Review 2019* 153; Western Cape Government 2020 <https://bit.ly/3a9bE7t>; CapeNature date unknown <https://bit.ly/3oOzoBR>; CapeNature date unknown <https://bit.ly/3d8XD1c>.

<sup>571</sup> WWF *Managing Rivers Wisely: South African Catchments Case Study 3*.

urban municipalities to give effect to the duties of municipalities in respect of microclimate regulation.

### *3.2.5 Incentive-based Instruments*

Incentives are important instruments in the environmental governance discourse. Incentive-based instruments, much like Skinner's theory on positive and negative reinforcement,<sup>572</sup> are based on the premise that rewarding good behaviour results in better compliance and penalising non-compliance will discourage bad behaviour.<sup>573</sup> There are an array of incentives that can encourage environmental protection through improved environmental practices and a decline in negative impact. These incentives include market-based,<sup>574</sup> regulatory, and information-based incentives.<sup>575</sup>

Market-based instruments (MBIs), as per the definition of the Organisation for Economic Co-operation and Development (OECD), are instruments that aim to -

address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services.<sup>576</sup>

From this, it is gleaned that MBIs are used to set off the external costs of production and activities as well as adverse effects of activities on ecosystems and their services. Furthermore, MBIs attempt to align and balance private and social costs, internalise environmental costs and reduce costs and effects of activities on third parties not involved in the production activities, which did not choose to incur costs and are not responsible for resulting effects.<sup>577</sup> Moreover, it aims to encourage efficient and sustainable use and management of ecosystem services.<sup>578</sup> MBIs are characterised as either positive or negative. Positive, in the sense that they reward and benefit corporations for good environmental practices. Negative, in that they intend to punish

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<sup>572</sup> See McLeod 2018 <https://bit.ly/31CcR24>.

<sup>573</sup> Paterson "Incentive-based Measures" 298.

<sup>574</sup> These incentives are also referred to as fiscal or economic incentives.

<sup>575</sup> Paterson "Incentive-based Measures" 298.

<sup>576</sup> OECD 2007 <https://bit.ly/2HC4hZP>.

<sup>577</sup> Huber, Ruitenbeek and Serôa da Motta *Market Based Instruments for Environmental Policymaking in Latin America and the Caribbean* 1, 11. See also Kenton 2020 <https://bit.ly/34vBi3c>.

<sup>578</sup> Paterson "Incentive-based Measures" 299.

corporations whose activities have a negative effect on the environment.<sup>579</sup> In the urban context, where the level of pollution and emissions are high and cause devastation for ecosystems and their services,<sup>580</sup> MBIs can be used to reward reduction in emissions or environmentally friendly practices or punish excessive pollution and emissions by corporations that exacerbate the urban heat island effect. Hence, positive MBIs are rewarded to parties that strive to improve their environmental impact and in so doing reduce and minimise the negative effects of their activities on ecosystems and contributes toward environmental protection.<sup>581</sup>

Parties that do not have sound environmental practices and perform activities that cause harm to the environment may be punished and held responsible through the imposition of negative MBIs.<sup>582</sup> This is in congruence with the polluter pays principle as set out in section 2 of the NEMA which determines that the party responsible for environmental harm, pollution, or degradation has the burden of paying for the remediation of such damage caused.<sup>583</sup> The polluter pays principle has the potential of deterring environmental harm because of the financial losses a person can incur as a result of their actions. This principle can be particularly helpful in encouraging environmental protection and the decline of pollution, especially in cities where pollution is a significant environmental threat and a great contributor to the heat island effect.<sup>584</sup> Negative MBIs are imposed to attempt to control and, in certain instances, limit the use of certain resources or products.<sup>585</sup> Ways of imposing such MBIs include the levying of charges, fees, taxes and bonds.<sup>586</sup>

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<sup>579</sup> Paterson "Incentive-based Measures" 299-302.

<sup>580</sup> See para 2.4 above.

<sup>581</sup> See Paterson "Incentive-based Measures" 300-301. Positive MBIs are rewarded by way of, for example, tax benefits in the form of tax deductions, exemptions and rebates on the different types of tax that people and corporate bodies alike are expected to pay; and the granting of a subsidy by the state for environmentally beneficial activities.

<sup>582</sup> Paterson "Incentive-based Instruments" 299, 302.

<sup>583</sup> Section 2(4)(p) of NEMA.

<sup>584</sup> Contrary to this principle, the *Draft Strategy to Address Air Pollution in Dense Low-Income Settlements*, 2016 brings the opposite to the table and argues that in terms of dense low-income settlements, the polluter is not able to pay due to poverty and is usually the victim to their own pollution - GN 356 in GG 40088 of 24 June 2016 (hereafter the Draft Air Pollution Strategy). See items 2.5 and 2.6 of the Draft Air Pollution Strategy; Paterson "Incentive-based Measures" 302.

<sup>585</sup> Paterson "Incentive-based Instruments" 302.

<sup>586</sup> Paterson "Incentive-based Instruments" 302-304.

Charges, such as emission, effluent and disposal charges, and user charges levied on municipal services, for example, seek to internalise the environmental costs caused by emissions, effluent discharge, and waste disposal. These charges are imposed either *ex post facto* in instances where prescribed thresholds are exceeded, or on the point sources of pollution based on the mass and concentration of emitted pollutants.<sup>587</sup> Parties should also expect to pay licence fees related to any authorisations and permits for activities that have a detrimental or potentially detrimental impact on the environment.<sup>588</sup> Product taxes allow for a way in which environmental costs of making, using and disposing of a product can be set off and the inclusion of such taxes may result in a decline in consumer demand, which collectively results in reduced pollution of the environment.<sup>589</sup> South Africa is utilising MBIs through the enactment of the *Carbon Tax Act*,<sup>590</sup> which aims to impose a tax on corporations and consumers for the emissions of GHG and provide for positive tax incentives as a reward for the efficient use of energy and reduction of emissions.<sup>591</sup> The Western Cape Government, for example, provides for Clean Energy Tax Incentives in terms of which tax deductions may be claimed for undertaking energy efficient measures in line with section 12L of the *Income Tax Act*<sup>592</sup> as well as section 12B for using measures that provide renewable energy.<sup>593</sup>

Regulatory incentives refer to incentives given by the regulatory authority to individuals or corporate bodies that go "beyond compliance" and what is expected from them in terms of the law.<sup>594</sup> Regulatory incentives are intricately intertwined with voluntary compliance measures that corporate bodies may use to comply with

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<sup>587</sup> Paterson "Incentive-based Instruments" 302.

<sup>588</sup> The introduction of such fees is permitted in terms of environmental legislation and are stipulated according to regulations in terms of such law. See for instance s 24(5)(c) of the NEMA; ss 37(2), 44(3), 45, and 47(3) of the NEMAQA; ss 93A(2) and 97(1)(f) of the NEMBA; ss 71(1) and 83(1)(g) of the NEMICMA; ss 45(2), 52(4) and 55(3) of the NEMWA; and ss 29(1)(b)(vi), 40(3), 41(1)(c), 43(2)(e), and 44 of the NWA.

<sup>589</sup> Paterson "Incentive-based Measures" 303. A prime example of this in South Africa is the fees levied on plastic bags which aim to reduce the use of non-recyclable plastics and encourage the consumer-base to re-use their plastic bags.

<sup>590</sup> *Carbon Tax Act* 15 of 2019 (hereafter the CTA).

<sup>591</sup> See the preamble of the CTA. See also SARS 2020 <https://bit.ly/2KW8pFV>.

<sup>592</sup> *Income Tax Act* 58 of 1962.

<sup>593</sup> Western Cape Government 2017 <https://bit.ly/2Keqeji>.

<sup>594</sup> Paterson "Incentive-based Measures" 304-305.

environmental legislation. Through the provision of regulatory incentives, corporate bodies are rewarded for using "self-regulatory" and voluntary measures to reduce the environmental impact their activities might have and for acceptable environmental practices and performances.<sup>595</sup> An example of this is the setting of emission standards that induce firms to lower their emissions to a greater extent than required to avoid more stringent restrictions in future.<sup>596</sup> Regulatory incentives have the potential to lessen the regulatory burden on behalf of the regulator as it allows the regulator to ease the monitoring of compliance for parties that go beyond what is expected.<sup>597</sup> In such circumstances, the regulator may reduce the administrative, as well as compliance and enforcement obligations and regulation of complying parties, which ultimately relieves the regulatory burden and capacity and resources constraints of the regulating authority and government departments.<sup>598</sup> This could mean less stringent reporting requirements and inspections, and less rigorous permitting procedures for developments.<sup>599</sup>

The last category is the information-based incentives, which are centred around the idea that the distribution on information regarding environmental performance will encourage better environmental practices through peer pressure or consumer pressure and the impact this has on corporate social responsibility.<sup>600</sup> Corporate bodies are inclined to change their production methods or products to be more environmentally friendly due to these pressures by way of introducing eco-labelling together with environmental performance monitoring and reporting as a way of gathering and disseminating information related to environmental practices.<sup>601</sup> Additionally, incentives are incorporated into the policy framework of South Africa and government departments are encouraged to use them.<sup>602</sup>

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<sup>595</sup> Anton, Deltas and Khanna 2004 *Journal of Environmental Economics and Management* 652.

<sup>596</sup> Khanna and Anton 2002 *Land Economics* 542.

<sup>597</sup> Paterson "Incentive-based Measures" 305.

<sup>598</sup> Khanna and Anton 2002 *Land Economics* 542; Paterson "Incentive-based Measures" 305, 307.

<sup>599</sup> Paterson "Incentive-based Measures" 305.

<sup>600</sup> See Paterson "Incentive-based Measures" 305.

<sup>601</sup> Paterson "Incentive-based Measures" 305-306.

<sup>602</sup> Examples of such incentives that that encourage conservation and environmental protection can be found in, for example, the Biodiversity White Paper 80-83; item 4.1.2 in GN 813 in GG 32474

### **3.3 Legal Enforcement Measures: Administrative and Judicial Action**

Along with substantive rights such as the environmental right discussed above,<sup>603</sup> the Constitution incorporates procedural rights that foster environmental governance. The relevant procedural rights are the rights to information, just administrative action and access to courts by way of judicial action.<sup>604</sup> These rights play an important part in the decision-making processes of government generally and when they make decisions concerning or affecting the environment. These procedural rights are also weapons in the arsenal of rights that serve to balance the powers of government, ensure accountability and transparency, and prevent and combat the abuse of public power and arbitrary or biased decision-making.<sup>605</sup>

#### *3.3.1 Administrative Action*

The constitutional provision for the right to access to information paved the way for the promulgation of the *Promotion of Access to Information Act*.<sup>606</sup> The right of access to information strengthens the notions of transparency, openness and accountability that governments are aiming towards.<sup>607</sup> This right to access to information is a valuable tool in ensuring the realisation of the environmental right and ensuring that public or private bodies do not infringe on this right.<sup>608</sup> Access to environment-related information has the potential to improve informed decision-making, monitoring, as well as environmental compliance and enforcement. It further acts as a catalyst for increased public participation through enabling easier access to information and

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of 3 August 2009 (hereafter the NBF); Department of Environmental Affairs and Tourism *National Climate Change Response White Paper* 40-42; Department Water Affairs *National Water Resource Strategy* 43, 87; Department of Environmental Affairs and Tourism *National Framework for Sustainable Development in South Africa* 31, 66; Gen Not 513 in GG 26169 of 14 May 2004 (hereafter the White Paper on Renewable Energy Policy); Department of Minerals and Energy *White Paper on the Energy Policy of the Republic of South Africa* 52, 85. See also Paterson "Incentive-based Measures" 301.

<sup>603</sup> See para 3.1 above.

<sup>604</sup> Sections 32, 33 and 34 of the Constitution.

<sup>605</sup> Preamble of the *Promotion of Administrative Justice Act* 3 of 2000 (hereafter the PAJA); Bray "Administrative Justice" 160.

<sup>606</sup> *Promotion of Access to Information Act* 2 of 2000 (hereafter the PAIA).

<sup>607</sup> See the Preamble of the PAIA.

<sup>608</sup> Du Plessis "Access to Information" 197.

increased awareness and education of the public regarding the environment, thereby enabling them to act as environmental watchdogs.<sup>609</sup>

The disclosure of the information is enabled through, among others, reporting duties placed on different actors in environmental governance. The reporting mandates of government are evident in the NEMA and sector-specific legislation. NEMA obliges reporting on the general state of the environment through the publication of an Environmental Outlook Report<sup>610</sup> and status reports (such as the State of the Environment Report (SOER), the status of biodiversity and conservation status reports).<sup>611</sup> These reports are ideal reporting mechanisms in which to include information pertaining to microclimate regulation ecosystem services as information in this regard is severely lacking. Reporting is also required in terms of the implementation of environmental management plans or environmental implementation plans,<sup>612</sup> indicators to measure compliance,<sup>613</sup> environmental authorisations and the potential impacts of activities on the environment.<sup>614</sup> Reporting also includes the commencement of unlawful or unauthorised activities,<sup>615</sup> and the implementation and compliance with environmental management programmes,<sup>616</sup> among other things. Generally, the information in respect of the above must be published in the *Government Gazette* as a way of distributing and disclosing information and these are usually open for comment by the public, allowing an adequate opportunity for public participation.<sup>617</sup>

There are two ways in which information regarding the environment, environmental performance, or the state of the environment may be obtained. In the first instance, information can be accessed via the public domain where public or private bodies release such information voluntarily or because they are obliged to do so via statutory

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<sup>609</sup> Du Plessis "Access to Information" 198.

<sup>610</sup> Section 16A of the NEMA.

<sup>611</sup> See ss 11 and 77 of the NEMBA as an example.

<sup>612</sup> Section 16(b) of the NEMA; s 45 of the NEMBA; s 13 of the NEMWA.

<sup>613</sup> Section 11 of the NEMPAA.

<sup>614</sup> Section 24 of the NEMA.

<sup>615</sup> Section 24G(1)(b)(vii) of the NEMA.

<sup>616</sup> Section 24N(2)(e) of the NEMA.

<sup>617</sup> Du Plessis "Access to Information" 201.

provisions to that effect.<sup>618</sup> Secondly, such information may be requested from private and public bodies and is usually granted if the disclosure of information is in the public interest.<sup>619</sup> Access to information may only be refused if a valid ground for refusal exists and when the need for non-disclosure outweighs the public interest.<sup>620</sup> The decision to refuse a request for information, similar to a decision that equates administrative action, must be accompanied by reasons for such refusal.<sup>621</sup>

The right to just administrative action requires that the decisions and actions by organs of state be lawful, reasonable and procedurally fair. In addition, justification must be given for such decisions or actions by way of providing the affected parties with reasons.<sup>622</sup> Administrative action<sup>623</sup> entails any decision taken or failure to take a decision by an organ of state in the exercise of a public power or the performance of a public function that they are mandated to do in terms of the law that adversely affects the rights of a person and has direct, external legal effect, which may in instances also relate to decisions made on environmental matters.<sup>624</sup> The requirement of lawfulness, in line with the principle of legality discussed above,<sup>625</sup> denotes a responsibility on the side of the administrator to act in a way provided for by law and

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<sup>618</sup> Du Plessis "Access to Information" 198.

<sup>619</sup> Du Plessis "Access to Information" 198. See also ss 8, 11 and 50 of the PAIA regarding information pertaining to the exercise of a power or performance of a function.

<sup>620</sup> Grounds for refusal include, *inter alia*, the need for protection of the privacy and personal information of a third party from undue disclosure (especially in the case of whistle-blowers), information that forms part of certain records of the South African Revenue Service (SARS), the protection of commercial information of a third party, protection of certain confidential information, protection of the safety of individuals and protection of property. Furthermore, a request may be refused if it is noticeably frivolous or vexatious in nature and if the effort involved in processing the request would significantly and unreasonably strain and hold up the resources of the public body. See in this regard s 31 of the NEMA; ss 34-45 and 63-69 of the PAIA.

<sup>621</sup> Section 25(3) and 56(3) of the PAIA. See also the discussion below on administrative action.

<sup>622</sup> Section 33(1) and (2) of the Constitution. See also s 5 of the PAJA.

<sup>623</sup> See s 1 of the PAJA. The definition of administrative action is extended to include the exercise of power and performance of a public function by a natural or juristic person other than an organ of state.

<sup>624</sup> This excludes: the executive powers or functions of the National Executive, the Provincial Executive; a municipal council; the legislative functions of Parliament, a provincial legislature or a municipal council; the judicial functions of a judicial officer of a court referred to in s 166 of the Constitution or a Special Tribunal, and the judicial functions of a traditional leader under customary law or any other law; a decision to institute or continue a prosecution; a decision relating to any aspect regarding the nomination, selection or appointment of a judicial officer or any other person, by the Judicial Service Commission in terms of any law; any decision taken, or failure to take a decision, in terms of any provision of the PAIA; or any decision taken, or failure to take a decision, in terms of section 4(1) – See s 1 of the PAJA.

<sup>625</sup> See para 3.1 above.

to refrain from acting *ultra vires*.<sup>626</sup> Besides being lawful, administrative action must be procedurally fair, which means that the administrator needs to adhere to the prescribed procedure and must act fairly and in a way that is not biased.<sup>627</sup> Procedural fairness additionally obliges the administrator to give adequate notice and description of the proposed administrative action, sufficient notice of any rights of review or appeal and the right to request reasons, as well as a reasonable opportunity to make representations in line with the *audi alteram partem* rule.<sup>628</sup> In terms of section 4 of the PAJA, an administrator may be expected to grant the public the opportunity to partake in the decision-making process via a public inquiry, notice and comment procedure, a combination of these or another appropriate procedure where the rights of the public are materially or adversely affected by administrative action.<sup>629</sup> The last requirement for administrative justice and reasonableness entails that the administrator must make rational and proportional decisions.<sup>630</sup> Moreover, the administrator may be requested to provide adequate reasons for the decisions taken or administrative action taken, and must provide such reasons in writing.<sup>631</sup>

In respect of environmental protection, authorities have the responsibility to perform their actions and take decisions permitted by law in a manner that is lawful, reasonable and procedurally fair and compliant with the requirements for such decisions in terms of the PAJA. Administrative justice and the actions accompanying this notion govern the decision-making processes of government, including those for environmental

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<sup>626</sup> Bray "Administrative Justice" 174.

<sup>627</sup> Bray "Administrative Justice" 176.

<sup>628</sup> See s 3(2) of the PAJA. The notion of *audi alteram partem* means that both sides of a case must be heard, in other words, an administrator cannot make a decision without allowing an affected party to make representations.

<sup>629</sup> Section 4(1) of the PAJA. This gives effect to the principle of public participation discussed later in this study- see para 3.4 below.

<sup>630</sup> In other words, the decision must be supported by evidence and information. It must be justifiable by way of valid reasons and the means proposed, and a decision taken by the administrator must relate and be in proportion to the ends and results intended or achieved by the administrative action - see Bray "Administrative Justice" 181-182.

<sup>631</sup> See s 5 of the PAJA. S 5(1) of the PAJA regulates that "any person whose rights have been materially and adversely affected by administrative action and who has not been given reasons for the action may, within 90 days after the date on which that person became aware of the action or might reasonably have been expected to have become aware of the action, request that the administrator concerned furnish written reasons for the action".

decisions and other decisions that may affect the environment.<sup>632</sup> A decision as envisioned in the PAJA<sup>633</sup> alludes to any decision that is administrative and is-

made, proposed to be made, or required to be made, as the case may be, under an empowering provision, including a decision relating to –

- (a) making, suspending, revoking or refusing to make an order, award or determination;
- (b) giving, suspending, revoking or refusing to give a certificate, direction, approval, consent or permission;
- (c) issuing, suspending, revoking or refusing to issue a licence, authority or other instruments;
- (d) imposing a condition or restriction;
- (e) making a declaration, demand or requirement;
- (f) retaining, or refusing to deliver up an article; or
- (g) doing or refusing to do any other act or thing of an administrative nature, and a reference to a failure to take a decision must be construed accordingly.

The administrative measures that are available to environmental authorities in ensuring compliance and enforcement with environmental legislation relate closely to the above description of what a decision entails in terms of the PAJA. Furthermore, they emphasise the need for environmental authorities to adhere to the requirements of administrative justice when making decisions. There are a collection of administrative measures and instruments available, namely: sanctions in the form of fines, the withdrawal of or establishment of conditions on permits and licences, as well as directives, abatement and compliance notices.<sup>634</sup>

In terms of NEMA, a directive may be issued in the case of pollution or degradation of the environment to get a person to cease or prevent any polluting or degrading activity. In addition, the directive may be issued to investigate and assess the impacts of specific activities, or to take reasonable and in some instances specific measures, and to continue with such measures and complete such measures before a given

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<sup>632</sup> Bray "Administrative Justice" 153. Some of the administrative actions relating to the environment are found in the NEMA and SEMAs. These include, inter alia, decisions made in respect of EIAs during the evaluation of developments that might have a detrimental effect on the environment, decisions pertaining to permits and licences, and the regulation of activities that pose a threat to ecosystems and biodiversity.<sup>632</sup> Environmental authorities exercise their functions through the utilisation of administrative measures to ensure compliance and enforcement of environmental law principles and regulations, as well as conditions and targets attached to authorisations, licences and permits, for example. See the discussion on EIAs, permits and licences at para 3.2.3.2 above.

<sup>633</sup> Section 1 of the PAJA.

<sup>634</sup> Bray "Administrative Justice"186; Winstanley "Administrative Measures" 225.

date.<sup>635</sup> The SEMAs also allow for the issuing of directives to enhance environmental protection and ensure that harmful activities are stopped.<sup>636</sup> A directive may only be issued if a competent authority, which may include a municipality, is convinced that a person has not implemented reasonable measures to prevent harm.<sup>637</sup> The decision to issue a directive qualifies as administrative action and must therefore comply with the statutory requirements for administrative action discussed above. Failure to comply with a directive issued in terms of NEMA does not constitute a criminal offence but may lead to the issuing of a compliance notice.<sup>638</sup> However, in terms of some of the SEMAs, non-compliance with directives might constitute a criminal offence and cause a person to be liable for a fine or imprisonment, as well as bearing the costs of harm suffered as a result of the offence.<sup>639</sup>

Compliance notices may be issued to guarantee compliance by parties that are in default and non-compliant with certain provisions of environmental law or requirements set out in a permit or authorisation in terms of the law.<sup>640</sup> In urban areas, where emissions are high and contribute to pollution and the increase in city temperatures, compliance notices may be used by local authorities to ensure that corporations that are in breach of their emission permits or licences comply with the requirements of such permits or licences.<sup>641</sup> A compliance notice, in terms of NEMA, must contain particulars of the non-compliance along with any steps the person is required to take, a timeframe within which such steps must be taken, any prohibitions on actions and time for which the prohibitions are valid, as well as the procedure to be followed in lodging an objection with regard to the compliance notice.<sup>642</sup> Compliance

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<sup>635</sup> Section 28(4) of the NEMA. The measures mentioned here include measures "to inform and educate employees about the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment; to cease, modify or control any activity causing pollution or degradation; to contain or prevent the movement of pollutants or the cause of degradation; to eliminate any source of pollution or degradation; or remedy the effects of the pollution or degradation" – see s 28(3) of the NEMA.

<sup>636</sup> See, for example, s 69(2) of the NEMBA; s 22A(4) of the NEMAQA; s 44(1) of the NEMPAA; s 37(1)(b) of the NEMWA; and s 19(3) of the NWA.

<sup>637</sup> See Winstanley "Administrative Measures" 228.

<sup>638</sup> Winstanley "Administrative Measures" 232. See also s 31L of the NEMA.

<sup>639</sup> See ss 22A(10)(c) and 51 of the NEMAQA and s 151(1)(d) of the NWA as examples. See also Winstanley "Administrative Measures" 233.

<sup>640</sup> Section 31L(1) of the NEMA; Winstanley "Administrative Measures" 234-235.

<sup>641</sup> Winstanley "Administrative Measures" 236.

<sup>642</sup> Section 31L(2) of the NEMA.

notices, like the issuing of directives, fall within the ambit of administrative action and are subject to the requirements set out in PAJA. In correlation with compliance notices, notice may be given to compel a person to comply with the requirements and conditions set out in authorisations, permits and licences. Should a person fail to comply with such notice and fail to remedy the breach of the fixed conditions, the authorisation, permit or licence may be withdrawn.<sup>643</sup> In addition to directives and compliance notices, the law makes provision for administrative penalties that can act as a disincentive for unlawful activity and non-compliance.<sup>644</sup> It is cautioned, however, that an administrative penalty may, if inappropriate to the circumstances, be misconstrued and considered a mere administration fee to process and consider an application and that companies might budget for such a penalty as a normal business expense and resultantly continue with harmful activities.<sup>645</sup> Nevertheless, it is argued that the use of administrative measures is more affordable than some other measures and that they are fairly easy to issue and potentially more efficient than criminal penalties in ensuring compliance and enforcement with environmental legislation.<sup>646</sup>

If the action performed or decision taken by the administrator in the above instances do not comply with the requirements of lawfulness, reasonableness and procedural fairness, the person affected by such action or decision may approach a court for appropriate relief.<sup>647</sup>

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<sup>643</sup> Sections 34C(1) and 31N(2)(a) of the NEMA; Regulation 47 in GN R385 in GG 28753 of 21 April 2006. It is interesting to note that the regulations pertaining to environmental authorisations in GNR 982 in GG 38282 of 4 December 2014 (reg 38) only provides for the suspension and withdrawal of environmental authorisations in instances where the competent authority has reason to believe that such authorisation was obtained through fraud, non-disclosure of material information or misrepresentation of a material fact. However, it does not explicitly provide for the withdrawal of an authorisation due to non-compliance with conditions set out therein.

<sup>644</sup> See para 3.2.5 above. An example of such penalty can be found in section 24G of the NEMA that establishes the payment of an administrative fine (which may not exceed the amount of R5 000 000) as a consequence of unlawfully commencing with an activity without authorisation. See Section 24G(4) of the NEMA.

<sup>645</sup> Winstanley "Administrative Measures" 238.

<sup>646</sup> Kidd 2002 *SAJELP* 33.

<sup>647</sup> See Bray "Administrative Justice" 158.

### 3.3.2 Judicial Action

South Africa's judicial authority is entrusted to the courts as independent and impartial bodies that must function in a manner free from fear, favour or prejudice.<sup>648</sup> There is a separation in the powers of courts (the judiciary) and the executive and legislative branches of government. No organ of state or person may interfere with the functioning of the court, and there is an expectation that organs of state must assist and protect the courts to safeguard the independence, impartiality, dignity, accessibility and effectiveness of courts.<sup>649</sup> There are a variety of courts, each with its jurisdiction. Among the range of different courts, the Constitution provides for magistrate's and "other courts" to be established and refers to these as the lower courts of South Africa.<sup>650</sup> These other courts arguably refer to specialised courts such as municipal courts with the competence to adjudicate and prosecute non-compliance with municipal by-laws, including those pertaining to environmental and service delivery matters.<sup>651</sup> It is trite that the judiciary plays a pertinent role in the enforcement of constitutional rights and acting as a check for the actions and decisions of the executive and legislative branches, to ensure that they do not act *ultra vires*. The judiciary has, in many instances, also been required to interpret and apply the law for environmental matters.<sup>652</sup> This showcases that the judiciary plays an important role in environmental protection and may arguably also be utilised for realising protection of microclimate regulation services.

Adjudication is used to resolve any legal disputes between parties and takes place before an independent arbiter such as a judge who is obliged to apply the law when

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<sup>648</sup> Sections 165(1) and (2) of the Constitution.

<sup>649</sup> Sections 165(3) and (4) of the Constitution.

<sup>650</sup> Sections 166 and 170 of the Constitution.

<sup>651</sup> These courts have the same status as district magistrate's courts and are therefore subject to the same laws than magistrate's courts like the *Magistrate's Courts Act* 32 of 1944, the *Criminal Procedure Act* 51 of 1977 (hereafter the CPA), the *National Prosecuting Authority Act* 32 of 1998, and the MSA. See Molaiwa *Municipal Courts and Environmental Justice in South African Local Government* 35, 42.

<sup>652</sup> See, for example, *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province* 2007 6 SA 4 (CC) (hereafter the Fuel Retailers-case) para 102; *Director: Mineral Development, Gauteng Region and SASOL Mining (Pty) Ltd v Save the Vaal Environment* (1999) 2 SA 709 SCA (hereafter Save the Vaal); *Hichange Investments (Pty) Ltd v Cape Produce Company (Pty) Ltd t/a Pelts Products* 2004 2 SA 393 (E).

making a binding decision on the facts presented by the parties.<sup>653</sup> The decisions of the judiciary, in many instances, form precedent based on the rule of *stare decisis*.<sup>654</sup> Case law is, therefore, an essential source in adjudication as it lays out the precedent followed by previous courts in similar cases.

According to the Constitution,<sup>655</sup> any person acting in their interest, the interest of someone unable to initiate proceedings themselves, or the interest of a class or group of persons (including anyone acting as a member of such group), and in the public interest as well as an association acting in the interest of its members, may approach a competent court for relief in instances where a fundamental right has been infringed or threatened.<sup>656</sup> In line with the *locus standi* requirements set out in section 38 of the Constitution, NEMA provides for an additional stipulation that allows a person acting in the interest of protecting the environment to also seek relief from the judiciary. This means that private parties and Non-Governmental Organisations (NGOs) may act against municipalities who do not fulfil their environmental protection mandate.<sup>657</sup>

NEMA explicitly allows people to institute and conduct prosecution where an organ of state breached any environmental protection duty which constitutes an offence in terms of law at any sphere of government (including local government) or in terms of regulations, permits, licenses, or granted authorisations.<sup>658</sup> This provision enables increased prosecutions as private prosecution of environmental offences can more easily be instituted than other private prosecutions. The CPA also allows those permitted by law to prosecute an offence to institute such prosecution after consultation with the relevant Director of Public Prosecutions (DPP) and in instances

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<sup>653</sup> Barnard-Naudé "Beregting, Uitleg en Geskilbeslegting" 202.

<sup>654</sup> *Stare decisis* obliges courts to follow and acknowledge previous decisions made by such courts unless the facts are significantly different from the case in which the precedent was formed, or where the decision of the previous court was detrimentally incorrect. Furthermore, lower courts are obliged to follow precedents set by higher courts - Barnard-Naudé "Beregting, Uitleg en Geskilbeslegting" 215.

<sup>655</sup> Section 38 of the Constitution.

<sup>656</sup> This arguably includes groups such as NGOs or lobby groups.

<sup>657</sup> Section 32(1)(e) of the NEMA. The Act subsequently broadens standing as it is provided for in the Constitution. Oosthuizen, Van der Linde and Basson "National Environmental Management Act 107 of 1998 (NEMA)" 191.

<sup>658</sup> Section 33 of the NEMA. S 32(1) of the Act applies to private prosecutions in terms of s 33, which means that a person instituting prosecution in terms of s 33 must do so in the interest of the public or in the interest of environmental protection.

where the applicable DPP declines to prosecute and issues a *nolle prosequi*-certificate.<sup>659</sup> NEMA lifts some of the stringent requirements set out by the CPA<sup>660</sup> on the condition that they meet specific prerequisites.<sup>661</sup> Upon meeting these prerequisites, NEMA specifies that a person does not have the responsibility to obtain the certificate *nolle prosequi* from the DPP and is also absolved from having to provide security as per the requirements in the CPA.<sup>662</sup> Kidd<sup>663</sup> argues that the alleviation of the burden on private persons and municipalities to adhere to these requirements has the potential to increase the occurrence of such prosecutions concerning environmental offences which enables persons to more conveniently institute prosecutions for environmental harm. The above also finds application for municipalities who may institute private prosecutions against persons that are non-compliant with the environmental and planning by-laws applicable in the municipal area.<sup>664</sup> Despite not having gained much popularity in South Africa as of yet, an example of private prosecutions relating to an environmental matter may be found in *Uzani Environmental Advocacy CC v BP Southern Africa (Pty) Ltd*.<sup>665</sup> In the Uzani-case the applicant instituted private prosecution against BP for the construction of several filling stations without authorisations in terms of section 24 of NEMA and damage caused to the environment as a result of unlawful actions.<sup>666</sup> The court may, in such instances, give relief in the form of remedies which are "mechanisms used to repair an infringement of rights".<sup>667</sup> There are several remedies available to aggrieved parties. The remedies are discussed below.

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<sup>659</sup> Section 8 of the CPA.

<sup>660</sup> These stringent requirements set out by the CPA include obtaining a certificate *nolle prosequi*, the right to institute private prosecution only be exercised after consultation with the attorney-general and subsequent withdrawal of the attorney-general's right to prosecution, payment of security to the effect that he "will prosecute the charge against the accused to a conclusion without undue delay" - see ss 7(2), 8(2), 9, and 10-17 of the CPA.

<sup>661</sup> See ss 33(2)(a)-(c) of the NEMA.

<sup>662</sup> Section 33(2)(c)(i) and (ii) of the NEMA. See also Kidd "Criminal Measures" 264.

<sup>663</sup> Kidd "Criminal Measures" 265.

<sup>664</sup> Section 112 of the MSA; Mujuzi 2016 *SAJCJ* 27.

<sup>665</sup> *Uzani Environmental Advocacy CC v BP Southern Africa (Pty) Ltd* 2019 5 SA 275 (GP) para 105 (hereafter the Uzani-case).

<sup>666</sup> The Uzani-case para 48.

<sup>667</sup> De Vos *et al South African Constitutional Law in Context* 390.

### 3.3.2.1 Constitutional Remedies

Where a person's fundamental rights are encroached on, a court may grant appropriate relief in the form of a declaration of rights or a declaration of invalidity.<sup>668</sup> Declarations of invalidity include mechanisms to regulate the effect of such a declaration.<sup>669</sup> These mechanisms include, *inter alia*, reading down, reading in, severance, notional severance, and the temporary suspension of a declaration of invalidity. There are also alternative remedies such as constitutional damages, and interdicts (including structural interdicts).<sup>670</sup> In respect of the abovementioned mechanisms, reading down is usually the first mechanism applied by courts in an attempt to interpret the invalid or conflicting part of a law or provision in a manner that would bring it in line with the purport of the Constitution.<sup>671</sup> Reading in entails that the judiciary read words into conflicting provisions of the legislation to make it constitutional and eliminate the invalidity caused by the omission of certain words necessary to make a provision constitutionally valid.<sup>672</sup> Severance is used to delete the invalidity from the provision, meaning that the particular section, subsection or merely the contradictory or invalid phrase or words are struck down and deleted to make the provision constitutionally valid.<sup>673</sup> As a midway between severance and reading down, notional severance pertains to instances where the court does not strike down a provision or part thereof nor interprets it differently. Instead, it ascribes the invalid part a different meaning that renders it constitutionally valid, and that is to be followed by others who apply that section.<sup>674</sup> Interdicts, discussed in more detail as part of the common-law remedies, may either be mandatory or prohibitory, may be utilised to induce the performance of a specific task or prevent the commencement or

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<sup>668</sup> Sections 38 and 172(1) of the Constitution; De Vos *et al South African Constitutional Law in Context* 392.

<sup>669</sup> De Vos *et al South African Constitutional Law in Context* 392.

<sup>670</sup> Currie and De Waal *The Bill of Rights Handbook* 183-205; De Vos *et al South African Constitutional Law in Context* 395-413.

<sup>671</sup> De Vos *et al South African Constitutional Law in Context* 394.

<sup>672</sup> De Vos *et al South African Constitutional Law in Context* 398; Currie and De Waal *The Bill of Rights Handbook* 187.

<sup>673</sup> Currie and De Waal *The Bill of Rights Handbook* 185; De Vos *et al South African Constitutional Law in Context* 396-397.

<sup>674</sup> De Vos *et al South African Constitutional Law in Context* 397-398.

continuation of a certain activity.<sup>675</sup> In addition to the above remedies, constitutional damages are also considered an appropriate remedy in situations where there is a vertical relationship between a state official or organ of state and plaintiff and in which a fundamental constitutional right of a plaintiff was infringed.<sup>676</sup> Constitutional damages are effective in that they "vindicate the fundamental right and deter future infringements" where other remedies are deemed inappropriate.<sup>677</sup> These constitutional remedies may be beneficial instruments when constitutional environmental right are infringed upon or where environmental harm occurs or is imminent. These constitutional remedies should be awarded in order to place the applicant whose fundamental rights have been infringed in the position they would have been if not for the infringement of their fundamental right as was done in both *Mahambehlala v MEC for Welfare, Eastern Cape*<sup>678</sup> and *Mbanga v MEC for Welfare, Eastern Cape*<sup>679</sup> with regard to their right to just administrative action.<sup>680</sup> It is arguable that such constitutional remedies may also be used in respect of other fundamental rights such as the environmental right and protection thereof. In some instances, however, a person may be more successful, claiming common-law remedies like those based in delict as the court might deem them more appropriate depending on the nature of the situation.

### 3.3.2.2 Common-Law Remedies

Common-law remedies are often used in the law of delict to compensate for the harm caused and damages suffered as a result of, as well as to impose liability for, the

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<sup>675</sup> Bellengère, Swanepoel and Karels "Gedingvoering" 263. This includes interdicts to either perform an activity that protects, conserves, or rehabilitates the environment and interdicts aimed at prohibiting a person to continue with or start a harmful activity that may detrimentally affect the environment.

<sup>676</sup> Barns 2013 *Responsa Meridiana* 1-2. Courts are not likely to order constitutional damages in instances where a plaintiff had already received delictual damages as it is held that state resources could be better utilized to address the causes of the infringement – see *Fose v Minister of Safety and Security* 1997 3 SA 786 (CC) para 72; De Vos *et al South African Constitutional Law in Context* 411; Currie and De Waal *The Bill of Rights Handbook* 202.

<sup>677</sup> Currie and De Waal *The Bill of Rights Handbook* 200.

<sup>678</sup> *Mahambehlala v MEC for Welfare Eastern Cape* 2002 1 SA 342 (SE) 356B-F (hereafter the Mahambehlala-case).

<sup>679</sup> *Mbanga v MEC for Welfare, Eastern Cape* 2002 1 SA 359 (SE) 370B-G (hereafter the Mbanga-case).

<sup>680</sup> Kotzé 2004 *PELJ* 81-86.

wrongful conduct of another person.<sup>681</sup> For a person to be able to approach a court for an order for a common-law remedy based on a delict, several requirements need to be present. There must be (a) an act or conduct, which is (b) unlawful, accompanied by (c) fault in the form of negligence or intent, (d) harm and (e) causation.<sup>682</sup> Should a person be able to establish the presence of these requirements, they may ask the court for damages (in the form of compensation or satisfaction).<sup>683</sup> Should there be no other ordinary remedy available to the person suffering harm as a result of the wrongful conduct of another, such a person may approach the court for an interdict to avert or prevent the conduct causing harm.<sup>684</sup>

An interdict aims to pre-empt or correct conduct causing harm.<sup>685</sup> When there is an unjustifiable infringement of a right contained in the Bill of Rights by an organ of state such as a municipality, a structural interdict may be issued by the court as an appropriate remedy to ensure compliance with duties and obligations ascribed to them by law. These duties may include any functions they may have in terms of environmental legislation and ecosystem protection.<sup>686</sup> Therefore, in an environmental context, an interdict can be sought from the court to prohibit an environmentally harmful activity from occurring or stop such activity from continuing and harming the environment. Interdicts may be sought by individuals and organs of states, such as municipalities, for purposes related to environmental protection and ensuring that town planning or zoning schemes are abided by.<sup>687</sup> Interdicts are useful instruments to prevent or halt conduct that cause nuisances such as emissions, pollution, smoke, odours, contamination of land or soil, amongst other things, which infringe upon the environmental rights of other people.<sup>688</sup> For illustration and the purpose of this study, the court in *Wakkerstroom Natural Heritage Association v Dr Pixley ka Isaka Local*

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<sup>681</sup> Summers "Common-law Remedies for Environmental Protection" 341. "Person" as referred to in this sentence includes juristic persons by way of vicarious liability.

<sup>682</sup> Neethling and Potgieter *Deliktereg* 4.

<sup>683</sup> Summers "Common-law Remedies for Environmental Protection" 341-342.

<sup>684</sup> Neethling and Potgieter *Law of Delict* 269.

<sup>685</sup> See para 3.3.2.1 above.

<sup>686</sup> De Vos *et al South African Constitutional Law in Context* 407.

<sup>687</sup> Summers "Common-law Remedies for Environmental Protection" 345.

<sup>688</sup> Summers "Common-law Remedies for Environmental Protection" 344-345.

*Municipality*<sup>689</sup> interdicted the municipality from continuing with the Wakkerstroom/Volksrust bulk water pipeline project as the pipeline they planned crosses several watercourses and wetlands and "threatens a sensitive and endangered ecosystem". This serves as an example of how interdicts may be used to protect ecosystems and the services they offer, such as the microclimate regulation services offered by the wetlands and watercourses that were subsequently protected in this case through the interdict.

Damages are compensatory in nature and aim to pay reparations to a person for the harm that they suffered due to the wrongful conduct of another. A reward of damages by a court confers liability for environmental harm suffered by another person or in terms of their private property.<sup>690</sup> However, a claim for damages may not be the most appropriate remedy where the environment is harmed, or there is no apparent victim suffering the wrongful conduct, and an award of damages might not hold any direct benefit for environmental integrity.<sup>691</sup> A claim for delictual damages for environmental harm is thus problematic in the sense that it might not meet all the requirements for it to qualify as a delict.<sup>692</sup> To illustrate, Summers<sup>693</sup> notes that the first requirement is distinguishable conduct causing harm. This might be challenging to identify in instances of widespread environmental pollution where it is undiscernible whose conduct resulted in environmental damage, as opposed to harm directly following an activity. Secondly, in considering the element of wrongfulness, environmental harm is likely be considered wrongful in the sense that there are laws governing and promoting the protection of the environment and preventing harm to it. However, it might be more challenging to satisfy the requirement of wrongfulness in instances where the liability cannot be determined or where there was no harm to persons or their property.<sup>694</sup> Fault in the form of negligence creates a grey area, as it requires the harm resulting from the conduct to be foreseeable,<sup>695</sup> which in the case of environmental

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<sup>689</sup> *Wakkerstroom Natural Heritage Association v Dr Pixley ka Isaka Local Municipality* 2019 ZAMP MHC 20 paras 29, 45 and 115 (hereafter the Wakkerstroom-case).

<sup>690</sup> Summers "Common-law Remedies for Environmental Protection" 342.

<sup>691</sup> Summers "Common-law Remedies for Environmental Protection" 352.

<sup>692</sup> Summers "Common-Law Remedies for Environmental Protection" 358.

<sup>693</sup> Summers "Common-Law Remedies for Environmental Protection" 358.

<sup>694</sup> Summers "Common-Law Remedies for Environmental Protection" 359.

<sup>695</sup> Summers "Common-Law Remedies for Environmental Protection" 361.

harm may not always be foreseeable. Furthermore, delictual actions require the element of causation in two forms, namely, factual and legal causation.<sup>696</sup> Factual and legal causation is considered notoriously evasive in cases of environmental harm as environmental harm does not in all circumstances manifest itself immediately but can take time to manifest. In many instances, this results in the harm suffered being considered too remote from the cause of pollution or resulting in the cause being deemed undeterminable.<sup>697</sup> In the context of environmental protection, where there is a toxic spill that pollutes an area containing a wetland, for example, it is arguable that where a municipality incurs related costs, these costs can be for cleaning up the environmentally hazardous substance, remedying the pollution, and rehabilitating the wetland to restore its ecosystem services. Such a municipality may institute a claim for damages against the responsible party for the patrimonial loss it suffered in line with the polluter-pays principle.<sup>698</sup> However, it is not the damage to the ecosystem or their services *per se* that may be claimed but rather losses suffered by people that have resulted from such environmental damage, like damage to property or clean-up costs; in other words, patrimonial loss.<sup>699</sup>

Where constitutional and common-law remedies do not suffice as adequate instruments for ensuring and enforcing environmental protection, and where they are not considered appropriate such as scenarios where there is no discernible victim, environmental legislation provides for other measures to ensure compliance and enforcement of the rules set out therein. The NEMA and SEMAs duly provide for offences and the criminal measures that may be implemented to address these offences.

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<sup>696</sup> Neethling and Potgieter *Deliktereg* 187-201. Factual causation determines that a person will only be liable if it is clear that his/her conduct resulted in the harm. In, in other words, if it were not for actions of the defendant the harm would never have resulted. In terms of legal causation, it is argued that where a chain-effect of harm results due to the act of the defendant, it should be determined for what he is deemed liable as a person will not be considered liable if the action and resultant harm are too remote from one another, meaning that a defendant will not be held liable for ulterior harm if it was not foreseeable or not a direct consequence of his actions.

<sup>697</sup> Summers "Common-Law Remedies for Environmental Protection" 361.

<sup>698</sup> Glazewski "General Legal Principles for Pollution Control and Waste Management" 543. See also s 2(4)(p) of the NEMA.

<sup>699</sup> Glazewski "General Legal Principles for Pollution Control and Waste Management" 543.

### 3.3.2.3 Criminal Measures

Criminal measures or sanctions serve a twofold purpose in that they aim to act as retribution or punishment for wrongful and unlawful conduct. Secondly, they seek to deter repeat-offences and others from acting unlawfully, thereby stigmatising certain wrongful behaviour and condemning such behaviour in the views of society.<sup>700</sup> The environmental law framework contains various references to criminal sanctions, in the form of fines and imprisonment, that are used to ensure compliance and enforcement of environmental legislation. The effectiveness of criminal measures as deterrents is dependent on the effective enforcement thereof and the odds of being apprehended, prosecuted, convicted or receiving a significant penalty for the transgression.<sup>701</sup> Kidd<sup>702</sup> accentuates the importance of proportionality in terms of the penalty, meaning that the penalty must be proportional to the transgression and cannot be too harsh or too lenient. If the penalty is not proportional, it could lead to disrespect for the law or failed deterrence.<sup>703</sup> In effect, this means that harsher penalties, such as imprisonment, should only be used for more severe transgressions where there was intent and where the transgression leads to significant harm to the environment or caused serious harm to the health and well-being of people.<sup>704</sup> Kidd identifies several weaknesses with criminal measures, which include, *inter alia*, the reactive nature of these measures, the time and costs related to prosecution, the onus of proof, and the number of procedural safeguards and hoops to jump through.<sup>705</sup> Litigation and prosecution do not come cheap, and processes can easily be delayed due to the capacity of courts, backlogs and the processes that need to be followed which can all lead to further unnecessary delay or obfuscation in the prosecution process. Other factors that may delay the implementation of criminal measures include the inadequate policing of environmental laws and regulations, the lack of public awareness about the requirements of the law, the lack of specialised courts with court

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<sup>700</sup> Kidd "Criminal Measures" 241.

<sup>701</sup> Kidd "Criminal Measures" 241.

<sup>702</sup> Kidd "Criminal Measures" 242.

<sup>703</sup> Kidd "Criminal Measures" 242.

<sup>704</sup> Kidd "Criminal Measures" 244.

<sup>705</sup> Kidd "Criminal Measures" 242-243.

officials specialising in and knowledgeable in environmental law and the resultant inadequate penalties that are given for transgressions by uninformed officials.<sup>706</sup>

In terms of NEMA, a person will be guilty of an offence if they contravene the provisions of the Act.<sup>707</sup> An act that constitute an offence in terms of NEMA is the commencement of a listed activity without the required authorisation.<sup>708</sup> Examples of such activities include, for example, the clearing of indigenous vegetation that offers microclimate regulate regulation services or the destruction of a wetland through the removal of the peat or peat soil where such removal is not for purposes of wetland rehabilitation and subsequently affects the wetland's capability to provide microclimate regulation services.<sup>709</sup> Section 49A criminalises certain unlawful and intentional acts or omissions such as, *inter alia* the commencement of a prohibited activity in terms of section 24 of the NEMA;<sup>710</sup> failure to comply with norms, standards, directives, compliance notices, and conditions of EIAs, management programmes or the NEMA;<sup>711</sup> the intentional and unlawful commencement of polluting or degrading activities or activities,<sup>712</sup> which causes harm to or detrimentally affects the environment.<sup>713</sup> Should a person be found guilty of any offence set out in section 49A, they may be liable to penalties by way of a fine or imprisonment as set out in section 49B of NEMA.<sup>714</sup> Section 49B also sets limitations to the penalties that might be imposed to keep them in line with proportionality requirements and it is up to the arbiter in the specific matter to determine the punitive amount of the fine for which a person will be liable and/or the time for which they will be imprisoned, depending on the facts of the case and the severity of the transgression.<sup>715</sup> Municipalities may in terms of the MSA also incorporate

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<sup>706</sup> Kidd "Criminal Measures" 243.

<sup>707</sup> See s 49A(1) of the NEMA.

<sup>708</sup> Section 49A(1)(a) of the NEMA. Other activities that will qualify as offences in terms of NEMA include, *inter alia*, the failure to comply with prescribed norms and standards, contravening conditions of an environmental authorisation, failure to comply with a compliance notice – See s 49A(1)(b)-(p) of the NEMA.

<sup>709</sup> See listed activities 15 and 24 in GN R984 in GG 38282 of 4 December 2014. See also para 2.3.1.1 above.

<sup>710</sup> See, for example, ss 49A(1)(a) and (d) of the NEMA.

<sup>711</sup> See ss 49A(1)(b),(c),(g),(h), and (k) of the NEMA.

<sup>712</sup> See ss 49A(1)(e) and (f) of the NEMA.

<sup>713</sup> Section 49A(1)(e) of the NEMA.

<sup>714</sup> Section 49B of the NEMA.

<sup>715</sup> Section 49B(1)-(3) of the NEMA.

criminal offences in their planning, and environmental by-laws and a person acting in contravention of such a by-law may be guilty of an offence.<sup>716</sup>

Imprisonment may not be the most appropriate penalty to impose in all circumstances, especially if the transgressor responsible for environmental harm is not a natural person, but a legal person such as a corporation. In such instances, the question of liability is complex. In the environmental sphere, especially, it often happens that big corporations are responsible for a significant part of environmental damage and pollution.<sup>717</sup> In situations such as these, corporate criminal liability might be set in motion to hold corporations accountable for environmental harm and degradation. Because corporations are legal persons and persons acting on their behalf cannot be held personally liable for transgressions of the corporation,<sup>718</sup> imprisonment is not a realistic penalty. Furthermore, the CPA states that in these instances only a fine may be imposed as penalty for environmental offences committed by corporations and where the use of criminal measures is deemed necessary for purposes of retribution and deterrence.<sup>719</sup> In cases where criminal measures are not necessary, other alternative penalties provided for in environmental legislation may be used such as the issuing of directives, compliance notices and other disincentives.<sup>720</sup>

### **3.4 NGO and Community Action**

Civil society acts as both a contributor to and beneficiary of sustainability. Civil society and civil society organisations, as well as NGOs and lobby groups, participate in government actions through influencing the performance of government departments (usually at the local government sphere) by speaking out against maladministration and abuses of government power, and civil action.<sup>721</sup>

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<sup>716</sup> Section 112 of the MSA.

<sup>717</sup> Kidd "Criminal Measures" 252.

<sup>718</sup> See *S v Coetzee* 1997 3 SA 527 paras 40–49 regarding the unconstitutionality of section 332(5) of the CPA which allowed for the personal criminal liability of directors or servants of a corporation.

<sup>719</sup> Section 332(2)(c) of the CPA.

<sup>720</sup> See para 3.3.1 above.

<sup>721</sup> Nel, Du Plessis and Retief "Key Elements for Municipal Action" 65. One way in which civil society or organisations can participate is through ward committees made up of members of council, advisory members (including experts from certain fields such as environmental law) that make

Civil-based measures are premised on the idea that collective action achieves more than individual action.<sup>722</sup> These civil and non-government role players assist in the improvement of environmental governance by pressuring the government to comply through advocacy and campaigns that coerce government into compliance and hold government accountable in terms of their legal obligations.<sup>723</sup> These environmental campaigns and activism against environmental issues creates public awareness and can facilitate better community participation in environmental protection initiatives and improvement of overall conduct or changes in behaviour to be less harmful to the environment. These campaigns are seen in the work of NGOs such as Earthlife Africa, Wildlife and Environment Society of South Africa (WESSA), and GroundWork which have several campaign projects aimed at environmental protection and sustainable use of resources, climate and energy justice, environmental health, sustainable tourism, as well as environmental education and awareness.<sup>724</sup> Consequently, NGOs and civil society can significantly contribute to knowledge about and protection of microclimate regulation ecosystem services through campaigns against the destruction of urban ecosystems, forests and wetlands; the continued high levels of emissions; unsustainable energy and waste practices; and unsustainable land-use development in cities.

Despite encouraging better community participation, civil action does not equate to public participation as envisioned in NEMA and the SEMAs. It rather involves taking a stand against environmentally harmful activities by the state and other transgressors such as private persons and may include, as mentioned above, judicial action, advocacy, activism, and environmental campaigns. Public participation, discussed in more detail below,<sup>725</sup> entails that government involve interested and affected parties

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recommendations on matters affecting the ward. Other committees (for example, sector-specific committees as provided for in the NEMICMA) may also be established as local environmental governance instruments – Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 132-133.

<sup>722</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 131. See also Holley, Gunningham and Shearing *The New Environmental Governance* 4.

<sup>723</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 131.

<sup>724</sup> Earthlife Africa 2020 <https://earthlife.org.za/about-us/>; Earthlife Africa 2020 <https://earthlife.org.za/campaign-climate-change/>; WESSA 2020 <https://wessa.org.za/>; Groundwork 2020 <https://bit.ly/3nxzUnq>.

<sup>725</sup> See para 3.4.2 below.

from civil society in decision and policymaking processes, allowing them to provide inputs and comments on proposed developments and policies. Public participation further entails the compulsory inclusion and consideration of the inputs of interested and affected parties on proposed activities by either government or other parties that may detrimentally affect the environment. Public participation as well as environmental education and awareness, have the capabilities to act as governance instruments for environmental protection.<sup>726</sup> It is argued that environmental education and awareness can, for the reasonable person, result in changes in behaviour and actions that do not exacerbate pollution and degradation of the environment.<sup>727</sup> It is also held that education, awareness and public participation have a relationship that comes forward in the principle of public participation. The public participation principle posits that "all people must have the opportunity to develop the understanding, skills and capacity" that they need to effectively participate in environmental governance that affects them or in which they are interested parties. NEMA also holds that "adequate and appropriate opportunity" for public participation must be provided where decisions are taken that could affect the environment.<sup>728</sup>

Civil society and NGOs are thus powerful civil-based instruments that can be utilised to ensure that ecosystems and their services are sufficiently protected and taken into consideration in the planning and development decisions of municipalities and other government entities. They also play a pertinent role in educating civil constituents and creating awareness among them regarding the importance of the protection of the environment and specifically urban ecosystems such as the cities in which these constituents live as well as urban ecosystem services upon which they depend on for their livelihoods. An aggregation of the effects of environmental, social movements, lobby groups and environmental activism and their fight for improved corporate conduct, environmentally responsible behaviour and corporate social responsibility

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<sup>726</sup> Sections 2(4)(h) and (f) of NEMA.

<sup>727</sup> Wessels and Mkhari "Environmental Management Training - A Civil Based Instrument to Ensure Environmental Protection and Legal Compliance: The Mooirivier Mall Case Study" 7-8. It is considered a precautionary measure to ensure protection of the environment.

<sup>728</sup> Section 23(2)(d) of NEMA.

triggered the use of alternate measures such as voluntary approaches by government and industry to contribute to environmental protection.<sup>729</sup>

### *3.4.1 Voluntary Compliance Measures*

The voluntary measures mentioned here refers to an assortment of measures that corporate entities or persons embark on to reduce and off-set the impact their activities have on the environment.<sup>730</sup> These measures are not necessarily promulgated in law, and their implementation and use are, therefore, not compulsory or enforceable through legislation.<sup>731</sup> These measures, in some instances, allow the achievement of a level of action beyond what is required in existing legislation.<sup>732</sup> Lehmann<sup>733</sup> emphasises that voluntary compliance measures are not meant to replace legislation and its regulatory framework but that they are merely supplementary forms of environmental management that can assist in the achievement of environmental protection. Through the acceptance and implementation of voluntary compliance measures, industry role players have come to play a pertinent role in environmental protection. Different types of voluntary compliance measures take the form of unilateral commitments (also known as self-regulation), public voluntary programmes, private agreements and negotiated agreements (also known as co-operation agreements).<sup>734</sup>

Unilateral commitments are borne out of industry initiative to reduce harmful impact on the environment caused by their practices and are not found in government regulation or necessarily law.<sup>735</sup> These commitments are a way for the industry to impose a measure of internal regulation of their activities to control and lessen the environmental impact associated with such activities and where corporate actors can

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<sup>729</sup> Lehmann "Voluntary Compliance Measures" 270-271.

<sup>730</sup> Lehmann "Voluntary Compliance Measures" 269.

<sup>731</sup> Lehmann "Voluntary Compliance Measures" 269.

<sup>732</sup> Van der Heijden 2012 *Environmental Politics* 486. An example hereof is provided by Lehmann, who states that this could pertain to a firm's decision to reach targets (such as those for energy-efficiency or the reduction of pollutants) beyond the targets set out in law – Lehmann "Voluntary Compliance Measures" 269.

<sup>733</sup> Lehmann "Voluntary Compliance Measures" 269.

<sup>734</sup> See Lehmann "Voluntary Compliance Measures" 274.

<sup>735</sup> Lehmann "Voluntary Compliance Measures" 275.

go the extra mile.<sup>736</sup> Companies may, therefore, if they choose, specifically incorporate the protection of microclimate regulation services into their targets and internal protection measures, which would put them beyond compliance. These self-regulation mechanisms are, however, not enforceable, and there are no legal consequences for non-compliance. This creates the need to incentivise compliance with incentive-based instruments and measures.<sup>737</sup> Corporate entities may include commitments to reduce their negative impact on the environment and microclimate regulation services in environmental management systems (EMS) and report thereon to remain in good standing with environmental organisations and the public as this strengthens their image of adhering to corporate social responsibility.<sup>738</sup> Adopting an EMS may further be beneficial for corporate actors if they are compliant with the International Organisation for Standardisation (ISO) guidelines in that they may then receive ISO 14001 certification.<sup>739</sup> Guidelines similar to the ISO guidelines may also be established for particular environmental standards that promote the protection of ecosystem services such as microclimate regulation. Other unilateral commitments and self-regulatory measures through which corporate entities are inspired to reduce their environmental impact are industry-wide codes of practice.<sup>740</sup> In addition to the above voluntary measures, there are also public, voluntary programmes hosted by regulatory authorities in which corporate entities may partake.<sup>741</sup> These programmes contain environmental targets that participating corporations are encouraged to meet. Participating entities can greatly benefit from participating in these voluntary

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<sup>736</sup> This is where beyond compliance or "beyond what is expected by legislation" comes into play. Self-regulation allows corporate entities to create their own targets and goals to be achieved that may exceed the expectations of what the law requires. Lehmann's example of the energy-efficiency and reduction of pollution targets are also applicable here as companies can, for example, set stricter requirements and targets to be met so that they not only comply with legislation and regulations, but they do so in an exemplary manner, i.e. with better energy-efficiency or lower pollution measurements than prescribed by law – see Lehmann "Voluntary Compliance Measures" 269, 275.

<sup>737</sup> Lehmann "Voluntary Compliance Measures" 276. See also para 3.2.5 above.

<sup>738</sup> Lehmann "Voluntary Compliance Measures" 277.

<sup>739</sup> The ISO 14001 standard determines environmental standards with which corporations must comply if they wish to obtain such certification - Lehmann "Voluntary Compliance Measures" 281 in this regard. See also Kidd "Administrative Law and Implementation of Environmental Law" 251.

<sup>740</sup> Lehmann "Voluntary Compliance Measures" 278. These codes of practice may arguably also be adapted to include practice codes that contribute to the protection of microclimate regulation services.

<sup>741</sup> Lehmann "Voluntary Compliance Measures" 289.

programmes by receiving, *inter alia*, public recognition, financial incentives, and trust on the part of the authority that the company is compliant with their legal obligations, which may decrease the monitoring of their activities.<sup>742</sup>

In contrast to voluntary public programmes, there are private programmes hosted by NGOs that involve the incorporation of "practices that go beyond what is required in terms of national legislation."<sup>743</sup> Participation in such programmes may also be incentive-driven as participation gains corporations good environmental reputations and improves their corporate social responsibility.<sup>744</sup> Another voluntary compliance measure that contributes to environmental protection is negotiated agreements between government and private persons.

The NEMA also incorporates environmental management cooperation agreements (EMCAs) into its framework and provides that government may enter into such agreements with any person or community.<sup>745</sup> In such an agreement, the community or person with whom the agreement is concluded with agrees to improve upon the standards for the protection of the environment in the relevant area.<sup>746</sup> These agreements stipulate targets to be met, monitoring and inspection arrangements, reporting, indicators, norms and standards, and obligations that the agreeing party undertakes to meet.<sup>747</sup> The above targets, arrangements, indicators, norms and standards, and obligations in EMCAs can be tailored specifically to the needs of the agreeing parties. This means that such EMCAs may include targets, obligations, and indicators relating specifically to measures that need to be undertaken for the protection of microclimate regulation services in cities. These agreements, once

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<sup>742</sup> See also para 3.2.5 above.

<sup>743</sup> Lehmann "Voluntary Compliance Measures" 293.

<sup>744</sup> Lehmann "Voluntary Compliance Measures" 293.

<sup>745</sup> See s 35(1) of the NEMA.

<sup>746</sup> Section 35(3)(a) of the NEMA.

<sup>747</sup> Section 35(3)(b)-(c) of the NEMA. EMCAs differ from PPPs in the sense that EMCAs are concluded for the betterment of the environment through agreeing on a range of targets, norms and standards and other conditions to be met by the company on its volition and in its name; while PPPs are agreements by which a private entity undertakes to perform a particular function of a municipality or by using government property – see the discussion on PPPs in para 3.2.4 above.

entered into, are legally enforceable, and non-compliance may result in consequences such as penalties.<sup>748</sup>

The use of EMCAs can, furthermore, improve public participation in environmental governance in cities and involve the public in efforts aimed at protecting ecosystem services in urban areas where they are situated, thereby enhancing the protection of microclimate regulation services and compliance with environmental law in general.<sup>749</sup> In cities, EMCAs have the potential to contribute significantly to lowering emissions and pollution, and to ecosystem protection, especially microclimate regulation. This can be achieved if local governments enter into such agreements with corporations and private parties to achieve certain emission reduction goals that will in effect lower city temperatures, as well as environmental management and protection goals to protect ecosystems that provide ecosystem services. The use of such agreements can also hold other parties to account for failure to comply with the agreement.<sup>750</sup> Lehmann<sup>751</sup> argues that negotiated agreements, such as EMCAs, create a strengthened co-operative relationship between industry, public and government. The author further posits that these agreements have a three-pronged advantage in that they promote innovation, grant the involved parties a leeway in the manner they achieve set targets and stimulate knowledge dissemination.

These agreements between the state and private bodies potentially contribute to the realisation of sustainable development and enhance co-operation between them.<sup>752</sup> which culminates in environmental awareness. Scholtz<sup>753</sup> highlights the importance of civil society in the governing of environmental affairs. He, further, postulates that the lack of capacity of authorities creates an opportunity for private entities to assist in environmental regulation and address environmental problems through the

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<sup>748</sup> Section 35(3)(d) of the NEMA.

<sup>749</sup> Nel, Du Plessis and Du Plessis "Instrumentation of Local Environmental Governance" 130; Oosthuizen, Van der Linde and Basson "National Environmental Management Act 107 of 1998 (NEMA)" 196-197.

<sup>750</sup> Bosman, Kotzé and Du Plessis 2004 *SAPL* 421.

<sup>751</sup> Lehmann "Voluntary Compliance Measures" 283.

<sup>752</sup> Lehmann "Voluntary Compliance Measures" 284.

<sup>753</sup> Scholtz 2004 *SAJELP* 184.

knowledge, capacity and understanding of complex environmental issues that they can contribute to.<sup>754</sup>

### *3.4.2 Public Participation*

Broadly, public participation is not only a legal procedural requirement in administrative processes as well as legislative processes, but it is also a vehicle for community action.<sup>755</sup> Public participation is firmly entrenched in the South African legal framework and finds particular attention in NEMA<sup>756</sup> and the SEMAs. The inclusion of public participation in the environmental law framework permits community members to take part in decision-making and the legislative process of municipalities.<sup>757</sup> Public participation is founded in the notion of participatory democracy which states that persons are entitled to participate in decision-making processes that affect them.<sup>758</sup> Public involvement of this nature is used to make representations regarding issues or stances that the community may have, to raise issues via petitions, and oral or written submissions at public hearings.<sup>759</sup>

NEMA provides for public participation as one of the general objectives of integrated environmental management and requires that adequate opportunity be ensured for such public participation in decision-making processes that may affect the environment.<sup>760</sup> Concerning the SEMAs, public participation gets specific attention in section 57 of the NEMAQA, section 100 of the NEMBA, section 53 of the NEMICMA, section 33 of the NEMPAA, and section 73 of the NEMWA. These provisions require that members of the public be invited to submit written representations or objections, or in appropriate circumstances present oral representations, related to proposed listed activities that may detrimentally affect the environment. In a similar vein to the

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<sup>754</sup> Scholtz 2004 *SAJELP* 191.

<sup>755</sup> See para 3.4 above.

<sup>756</sup> NEMA establishes in its preamble that "the law should establish procedures and institutions to facilitate and promote public participation in environmental governance".

<sup>757</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 134; De Vos *et al South African Constitutional Law in Context* 120.

<sup>758</sup> De Vos *et al South African Constitutional Law in Context* 120.

<sup>759</sup> De Vos *et al South African Constitutional Law in Context* 120.

<sup>760</sup> Section 23(2)(d) of the NEMA. EMCAs, as discussed above at para 3.4.2, may in terms of section 35(2)(b) of NEMA only be entered into after public participation procedures.

environmental legislation mentioned here, the MSA also ascribes local communities the right to contribute to decision-making processes of the municipality and allows them to submit written or oral recommendations, representations and complaints concerning the activities and decisions of municipalities. This effectively establishes a space for public participation and community engagement in the activities of municipalities.<sup>761</sup>

Public participation could effectively hold the government to account and ensure that they perform the necessary environmental protection duties and act within their ambit. It could also ensure that the necessary environmental interests such as the protection of ecosystem services are taken into consideration in planning and development decisions.<sup>762</sup> This might be a crucial instrument employed by local communities in instances where development or decisions by governments or other private persons will impede on ecosystems and their ability to provide the necessary ecosystems services on which such communities are dependent, including microclimate regulation services. Governments must consider all the interests that are raised as they are the trustees of the environment on behalf of the public.<sup>763</sup>

### ***3.5 Concluding Remarks***

The objective of the present chapter was to identify and critically evaluate the existing instruments in the South African legal framework, inclusive of the environmental, planning, and local government law and policies that enable or hinder the protection of microclimate regulation as an ecosystem service. The objective in this chapter necessitated a literature review of both primary and secondary sources of law to determine what the existing legislation and policy sets out in respect of instruments that foster the protection of microclimate regulation in city ecosystems.

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<sup>761</sup> Sections 5(1) and 16 of the MSA.

<sup>762</sup> For this to be achieved, it is necessary that the local communities affected by certain actions, decisions or developments, NGO's, and other relevant stakeholders on behalf of social, economic and environmental interests participate in discussions with the government in order to ensure that the government takes all interests into consideration.

<sup>763</sup> This places a fiduciary duty on the government to protect the environment and its resources as it belongs to the beneficiaries (the people) as their common heritage and the use thereof must be beneficial and serve the public interest – see s 2(4)(o) of NEMA.

The investigation into the instruments available for the protection of microclimate regulation services highlighted several possible instruments. The discussion on the applicable instruments illuminated a distinction between instruments that are voluntary and those that are enforceable as they are required by law. There are a lot of compulsory, legally required instruments ranging from the attainment of authorisation before the commencement of a listed activity, all the way to development planning requirements. Municipalities have no choice but to incorporate the mandatory instruments. However, it seems plausible that they may use such instruments in ways that integrate the protection of microclimate regulation services, as envisioned in this study. There is also provision for sector-specific instruments such as bioregional plans and declarations of protected areas. All of these can be innovatively used to realise the protection of microclimate regulation ecosystem services in urban areas.

The intricately linked nature of the planning instruments with environmental concerns is evidenced by how both the planning and environmental law legislation contain requirements related and usually ascribed to the other sector of law. This means that planning law requires plans and frameworks provided for in environmental legislation to be included in the planning instruments such as the IDP, and *vice versa*. Based on this analogy, it is possible to also discern that the same can be done with microclimate regulation services, in that it can be included into planning and development considerations, and that planning is an important factor in the vision of protecting microclimate regulation services and the ecosystem resources that provide them.

Spatial planning was discussed in a broad sense, highlighting the relevant instruments of importance to all spheres of government. This discussion also referenced a number of voluntary instruments in the line of PPPs and incentive-based measures, that enable environmental protection and are readily available to be used by governments to enforce compliance. The discussion then turned to legal enforcement measures which predominantly concerned instruments not necessarily found explicitly in environmental or planning law but rather in the wider legal framework. The inclusion of such instruments is important as they may apply in some way or form to other instruments discussed in this chapter and the following chapter. These instruments include

administrative and judicial action and more common and well-known legal instruments related thereto such as damages, interdicts, and prosecution, amongst others.

As evidenced by the extensive discussion on different options in law and the wide array of instruments, there is by no means a shortcoming of instruments to be employed by local government to realise protection of microclimate regulation services in cities. In fact, it is argued that many of these are already in use, whereas others might not be suited to either the South African context or capacity of municipalities. There is ample opportunity for the implementation of a range of these instruments to determine which voluntary-based instruments are best suited to realise the protection of microclimate regulation. Many of these instruments have not been tried and tested like some of the more popular ones, and this may mean that they are underutilised gems waiting to be discovered. It is important that government comply with the range of legally required instruments as the other instruments are not suggested as replacing instruments but rather as alternatives to be used in conjunction to the mandatory ones to ensure the protection of microclimate regulation services. Many of these instruments will further have a better range of application at the municipal level as it is where the problems are most easily addressed due to the nature of local government and their proximity to the people and their needs.

In the penultimate chapter (chapter four) of this study, the authority of the local sphere of government comes into play. In chapter four, the attention will shift to the utilisation and relevance of applicable instruments based on the discussion in chapter three. Chapter four concerns a critical determination of specific municipal governance instrumentation that enable municipalities to promote the protection of microclimate regulation services.

## **Chapter 4 Municipal Governance Instrumentation for the Protection of Microclimate Regulation Services**

### ***4.1 Introduction***

In light of the discussion in chapter three, it is evident that the legal framework of South Africa encapsulates a plethora of instruments that may be utilised in the battle for improved environmental governance and environmental protection in urban areas. This chapter adopts a narrower focus and considers only those instruments that have a bearing on cities (urban municipalities) and are applicable to the circumstances, mandates, and environmental governance in the local government sphere.

This chapter aims to critically discuss specific municipal governance instrumentation available in South African law and determine whether these instruments enable or hinder the protection of microclimate regulation as an urban ecosystem service.

### ***4.2 An Overview of the Environmental Authority (Powers) of Local Government***

The local sphere of government is made up of municipalities which have the capacity to govern the local affairs of their communities.<sup>764</sup> The other spheres of government may not impede on the ability and right of local government to exercise its powers and perform its functions.<sup>765</sup> Together with the Constitution, the MSA grants municipalities their authority. Municipalities are defined as organs of state within the local sphere of government that have the legal mandate to employ legislative and executive authority within the applicable specified area of jurisdiction, which in the context of this study is limited to the urban area in which such municipality governs.<sup>766</sup> A municipality consist of a political structure, administration of the municipality and the local communities under it. However, it is regarded as having separate legal

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<sup>764</sup> Section 151(3) of the Constitution.

<sup>765</sup> Section 151(4) of the Constitution.

<sup>766</sup> Section 2 of the MSA.

personality so that its community does not carry any liability for the actions of the municipality.<sup>767</sup>

The Constitution stipulates that local governments have the tasks of providing democratic and accountable government. They also ensure the provision of services to communities in a sustainable manner and promote social and economic development. Besides this, they encourage the involvement of communities and community organisations in the matters of local government. Perhaps, most notably in the context of this study, they promote a safe and healthy environment.<sup>768</sup> Local governments are required to attempt to achieve these objectives within their available financial, technical and institutional capacity.<sup>769</sup> Given the reference to sustainable development as well as economic and social development in the constitutional environmental right,<sup>770</sup> it is necessary to consider the developmental mandates of the local sphere of government insofar as they affect the environment in cities.<sup>771</sup> When section 152 is read alongside the environmental right regarding the objects of local government, it is evident that the object of local government to promote social and economic development is closely intertwined with its object to promote a safe and healthy environment.<sup>772</sup>

The Constitution also provides for development and planning mandates in schedules 4 and 5 that devise the functional areas of legislative competence of different spheres of government.<sup>773</sup> The local sphere of government's authority in terms of the environment is often contested and brought into question as local governments are ascribed the exclusive competence and mandate to legislate regarding specific areas.

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<sup>767</sup> Sections 2(b) and (d) of the MSA.

<sup>768</sup> Section 152(1) of the Constitution. This section is emphasised by its inclusion in s 4(2) of the MSA.

<sup>769</sup> Section 152(2) of the Constitution.

<sup>770</sup> Section 24(b)(iii) of the Constitution which provides that the environment must be protected, "for the benefit of present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

<sup>771</sup> This interrelationship between the environment and development is discussed in detail by Du Plessis and Nel in the introductory chapter of *Environmental Law and Local Government in South Africa* - See Du Plessis and Nel "Introduction" 4. See also the Fuel Retailers case para 45.

<sup>772</sup> Fuel Retailers-case para 44.

<sup>773</sup> Schedules 4A and 4B, as well as Schedules 5A and 5B of the Constitution. See also the brief discussion hereon in para 1.1 above.

They may legislate on air pollution, building regulations, electricity and gas reticulation, municipal planning, stormwater management systems in built-up areas and water and sanitation services, municipal parks and recreation, refuse removal, refuse dumps and solid waste disposal, and public spaces, to name but a few. However, the environment is not explicitly designated as one of their competencies.<sup>774</sup> Even though the environment and nature conservation is listed as a concurrent competence of the national and provincial spheres of government in terms of schedules 4A and 5A, it is argued that these are in some instances incidental to the legislative competences of local government. This is due to their mandate in other legislation as well as other provisions in the Constitution that they may legislate on these matters to ensure a safe and healthy environment.<sup>775</sup>

Of relevance is the principle of subsidiarity.<sup>776</sup> This principle finds application in the division of functions and powers across the different spheres of government. This section entails that the local sphere of government may be assigned matters occurring in parts A of schedules 4 and 5 in the Constitution. In other words, matters that fall within the legislative competence of the national and provincial spheres of government must be assigned to the local sphere of government, where it relates to local government, or would most effectively be administered by locally, and where the local government has the capacity to administer it.<sup>777</sup> The MSA also contains a provision to this effect and declares that municipalities have the right to do "anything reasonably necessary for, or incidental to," the effective performance of its duties.<sup>778</sup> In correlation with this section, scholars argue that local government is best positioned "to govern and influence the collective governing of natural resources and their uses", as well as

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<sup>774</sup> Schedule 4B and 5B.

<sup>775</sup> Section 156(4) and (5) of the Constitution; *Le Sueur v eThekweni Municipality* 2013 ZAKZPHC 6 para 20 (hereafter the *Le Sueur*-case); Nel, Du Plessis and Retief "Key Elements for Municipal Action" 85; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 94-95; Freedman 2014 *PELJ* 581-583, 587; Snijman and Petterson "Environmental Law Compliance and Enforcement" 291-297. See also *Mazibuko v City of Johannesburg* 2010 4 SA 1 (CC).

<sup>776</sup> See s 164(4) of the Constitution.

<sup>777</sup> De Visser *Subsidiarity in the Constitution* 1.

<sup>778</sup> Section 8(2) of the MSA.

the urban ecosystems in the area of the municipality, as they are the sphere of government closest to the people.<sup>779</sup>

The aforementioned planning and developmental duties of the different spheres of government give rise to planning legislation such as the SPLUMA. Too often are the environment and planning considered to form part of two discrete and separate areas of governance. Yet, they are inextricably connected based on the notion of sustainable development.<sup>780</sup> To achieve all of the developmental and planning duties as well as the environmental right, government departments and the different spheres of government, inclusive of local governments, need to work together through co-operative governance. All must find a way of integrating the environment and environmental concerns into decision-making processes and planning.<sup>781</sup>

In addition to the mandates stipulated above, the Constitution apports specific environmental powers and functions to municipalities in section 156. These powers and functions incorporate the executive authority local governments have in respect of matters in schedules 4B and 5B of the Constitution and those assigned to it by the other spheres of government.<sup>782</sup> Moreover, it encompasses functions regarding the legislative and executive functions by providing local governments with the power to formulate, pass, and give effect to by-laws in order to realise and manage matters within its purview. This includes environmental and urban ecosystem services protection.<sup>783</sup> The executive and legislative authority of municipalities is further realised through the adoption of policies, plans, strategies and programmes; promoting and ensuring development, administering the affairs of local government, ensuring compliance and enforcement of relevant legislation, and provision and regulation of

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<sup>779</sup> Nel, Du Plessis and Retief "Key Elements for Municipal Action" 52, 85.

<sup>780</sup> Kihato *Integrating Planning and Environmental Issues through the Law in South Africa: Learning from International Experience* 6. See also para 3.2.2 above.

<sup>781</sup> The use of an integrated approach is necessary to circumvent the silo-based and fragmented approaches previously used, and still prevalent in some instances, in planning and other development decisions despite the provision for co-operative governance - see Nel and Du Plessis 2004 *SAPL* 183.

<sup>782</sup> Section 156(1) of the Constitution. In terms of the assignment of functions and powers of other spheres of government see ss 9 and 10 of the MSA.

<sup>783</sup> Section 156(3) of the Constitution.

municipal services.<sup>784</sup> Municipalities may also impose rates and taxes, levies and duties on consumers and people in their community for the delivery of municipal services.<sup>785</sup> In line with the principles of transparency, openness, and accountability referred to in chapter three,<sup>786</sup> municipalities are also obliged to conduct their business openly.<sup>787</sup> In terms of duties related to, or incidental to, the environment and the protection thereof, the *Municipal Structures Act* sets forth the functions and powers of municipalities relating to integrated development planning and IDPs, potable water supply systems, bulk supply of electricity, domestic waste-water and sewage disposal systems, and solid waste disposal, among other things.

### ***4.3 Local Governance Instruments with Environmental Application***

The local sphere of government is legally well equipped in terms of available instruments at its disposal to participate in environmental management and governance to realise the protection of microclimate regulation services in urban municipal areas.<sup>788</sup> Local government law directs the local sphere of government on how to use the instruments at their disposal, especially on the subject of planning instruments used in municipal integrated development planning.

#### ***4.3.1 Municipal Integrated Development Planning***

The *Municipal Structures Act* sets out ways in which integrated, sustainable, and equitable social and economic development can be achieved in demarcated municipal areas. These ways include the use of integrated urban development planning, promotion of bulk infrastructure development (which may include green infrastructure) and services in city areas, capacity-building of urban municipalities, equitable distribution of resources to ensure appropriate levels of service delivery in the applicable urban area.<sup>789</sup>

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<sup>784</sup> Section 11(3) of the MSA.

<sup>785</sup> Section 160(2)(c) of the Constitution; s 4(c) of the MSA. See also the discussion on incentive-based instruments in para 3.2.5 above.

<sup>786</sup> See para 3.2.1 above.

<sup>787</sup> Section 160(7) of the Constitution; Preamble of the MSA.

<sup>788</sup> See para 4.2 above.

<sup>789</sup> Section 83(3) of the *Municipal Structures Act*.

Integrated planning, as provided for in the MSA, requires a municipality to undertake developmentally oriented planning to realise its developmental duties.<sup>790</sup> The planning mandate fulfilled by the local sphere of government must give effect to co-operative government principles as discussed in chapter three, and their plans must be aligned with those of other organs of state in the other spheres of government.<sup>791</sup> Some integrated environmental management instruments fit into the integrated development planning phases of a municipality which include, *inter alia*, EIAs and EMFs.<sup>792</sup>

#### 4.3.1.1 Integrated Development Plans

As previously stated, the main instrument in municipal integrated development planning is the IDP.<sup>793</sup> It is argued that as part of the integration between economic and social development and the tripartite notion of sustainability referred to in the constitutional environmental right, the environment and issues related thereto, especially in cities, must be included in the IDP of municipalities.<sup>794</sup> The IDP is described as "a single, inclusive and strategic plan" for development in the municipality.<sup>795</sup> The planning process of an IDP is apportioned into five procedural phases, namely: analysis, strategy, project, integration, and approval phases.<sup>796</sup>

The first phase of analysis regards the collection and compilation of information pertaining to the status quo of the municipality including information in respect of its demographics, the environment, finances and other matters relevant to determining its needs and challenges.<sup>797</sup> This phase should be utilised to identify and take cognisance of environmental issues by way of environmental analysis.<sup>798</sup> The strategy phase in the process of creating an IDP is usually done with the assistance of

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<sup>790</sup> Section 23(1)(a) and (b) of the MSA.

<sup>791</sup> Section 24 of the MSA.

<sup>792</sup> Retief and Cilliers "Municipal Integrated Development Planning" 178. See also the discussion in para 4.4 below.

<sup>793</sup> See para 3.2.2.1 above.

<sup>794</sup> Van Wyk "The Law on Planning and the Environment" 1148. See also s 23(1)(c) of the MSA.

<sup>795</sup> Section 25(1) of the MSA.

<sup>796</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 232.

<sup>797</sup> Retief and Cilliers "Municipal Integrated Development Planning" 174, 187; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 232.

<sup>798</sup> Retief and Cilliers "Municipal Integrated Development Planning" 175.

specialists and is based on formulating solutions to identified shortcomings in the analysis phase. It also speaks to the formulation of a vision statement, development objectives and strategies, as well as the localisation of principles and policy guidelines, also concerning the natural environment, ecosystem services and compliance with NEMA principles.<sup>799</sup> The project phase is concerned with the development of project objectives, indicators, budgets for specific parts of the project, timeframes, management and implementation, as well as the design of projects to address the identified challenges and shortcomings in urban areas.<sup>800</sup> Municipalities may use this phase to complement plans in the strategy phase and should reflect environmental considerations.<sup>801</sup> The penultimate phase concerns the consideration of relevant factors (such as environmental, social and economic interests) and sector-specific plans and integration.<sup>802</sup> It is the phase where the municipality is required to ensure integration with objectives and strategies, principles, relevant legislation, supporting and sectoral planning instruments, and the capacity framework of the municipality.<sup>803</sup> In this phase, a municipality must ensure the consideration of the impact on ecosystems in municipal projects. It must also consider urgent environmental issues such as the consideration of urban ecosystem services and concomitant issues like addressing the heat island effect in cities and creating a balance between sector plans and compliance with legislation.<sup>804</sup> Finally, the approval phase concerns the alignment and adoption of the IDP after the necessary monitoring, assistance and inputs from the relevant provincial government, as well as the relevant adoption process.<sup>805</sup>

An IDP has to contain the long-term development vision of the municipality. It must include the critical needs; reference to the existing level of development; development priorities, objectives, and strategies; and SDF with basic guidelines regarding the land

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<sup>799</sup> Department of Provincial and Local Government *IDP Guide Pack* 12; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 232; Retief and Cilliers "Municipal Integrated Development Planning" 174-175.

<sup>800</sup> Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 233; Department of Provincial and Local Government *IDP Guide Pack* 13.

<sup>801</sup> Retief and Cilliers "Municipal Integrated Development Planning" 174, 188.

<sup>802</sup> Department of Provincial and Local Government *IDP Guide Pack* 13.

<sup>803</sup> Retief and Cilliers "Municipal Integrated Development Planning" 174; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 233.

<sup>804</sup> Retief and Cilliers "Municipal Integrated Development Planning" 175.

<sup>805</sup> Department of Provincial and Local Government *IDP Guide Pack* 10; Section 29 of the MSA.

use management system; disaster management plans, financial plans; and key performance indicators and targets of the municipality including those related to the protection of ecosystem services.<sup>806</sup> The IDP may also contain or make reference to maps, statistics or other documents of the urban area that the municipality deems appropriate and necessary to include.<sup>807</sup> The IDP must also comply with requirements of public participation, and communities must be consulted to determine their development needs and priorities.<sup>808</sup>

The main purpose of an IDP is to guide and inform all planning and development decisions of the municipality and how they are to be implemented. These planning and development decisions include the consideration of environmental concerns and implementation of relevant environmental management plans and programmes into the planning of the municipality. The IDP is binding on each respective municipality. Therefore, a municipality is resultantly obliged to give effect thereto and act in manner consistent therewith.<sup>809</sup> It is pertinent for municipalities to plan for sector-specific development in an integrated manner and incorporate such plans into the integrated development strategy. This is done to align objectives set out in such plans to become part of the objectives and targets of the municipality as they are expected to comply with and implement the IDP in its entirety.<sup>810</sup> Several of the SEMAs indicate that specific environmental management plans such as waste management plans as well as coastal management plans and programmes must be included in the IDP of a municipality.<sup>811</sup> Through the innovative use of these management plans, urban municipalities may incorporate such sector plans related to other parts of their environmental mandates into their IDPs.<sup>812</sup> This grants an urban municipality the opportunity to include environmental concerns regarding ecosystem services

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<sup>806</sup> Section 26 of the MSA. See also reg 2(1) in GN R 796 in GG 22605 of 24 August 2001.

<sup>807</sup> Reg 2(2) in GN R 796 in GG 22605 of 24 August 2001.

<sup>808</sup> Section 29(1)(b) of the MSA.

<sup>809</sup> Van Wyk "The Law on Planning and the Environment" 1149.

<sup>810</sup> Department of Provincial and Local Government *IDP Guide Pack 8*.

<sup>811</sup> Van Wyk "The Law on Planning and the Environment" 1149. See also s 16(4)(b) of the NEMA; s 15 of the NEMAQA; ss 48(2), 54 and 76(2)(b) of the NEMBA; ss 42(4)(e), 46(4), 48(4) and 51 of the NEMICMA; s 41(3) of the NEMPAA; ss 9(2)(b) and 11(4)(a)(ii) of the NEMWA; ss 12 and 15(5) of the WSA, all of which provide for the inclusion of management plans, etc. into the IDP of the municipality.

<sup>812</sup> Du Plessis "Local Government and the Pursuit of Urban Sustainability in South Africa" 268.

protection in its IDP, which provides for microclimate regulation services, in particular, due to their critical function of temperature regulation in urban agglomerations under the control of such municipality.<sup>813</sup> As part of its open space planning, the City of Johannesburg included ecosystem services in its IDP with the view to improve the microclimate, air and water quality and highlighted the importance of the incorporation of ecosystem services in municipal planning initiatives.<sup>814</sup> The City of Tshwane in its *Integrated Development Plan: Revision For 2020/21 and Service Delivery and Budget Implementation (SDBIP) Scorecard, 2020* also provides specifically for the climate responsiveness of the city.<sup>815</sup> Through such inclusions in the IDPs of municipalities, it is discernible that municipalities are expected to include environmental concerns such as the protection of microclimate regulation ecosystem services into their planning and development plans. Furthermore, the implementation of an IDP is subject to monitoring from the provincial level and reporting by the urban municipality.<sup>816</sup> The IDP is, therefore, an enabling instrument that allows municipalities to plan and make planning decisions on aspects of the environment relating to ecosystem services and microclimate regulation services, as far as it relates to planning and land use in the municipality.

Some of the challenges that urban municipalities might experience in the implementation of IDPs relate to limited budgets and funding, lack of integration between plans and policies resulting in fragmentation and ever-present capacity challenges. Municipal budgets and funding are crucial for the implementation of plans and policies and, as such, insufficient funding or budget allocation may hinder the implementation of the vision of the municipality.<sup>817</sup> This may mean, for example, that the innovatively used sector plans of municipalities that provide for the protection of microclimate regulation, may not be effectively implemented and may take the back-burner to other objectives in the IDP. Budget and funding challenges go hand-in-hand with capacity constraints in municipalities. Municipalities are generally faced with

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<sup>813</sup> See Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 231.

<sup>814</sup> City of Johannesburg *2017/18 Integrated Development Plan Review* 93.

<sup>815</sup> City of Tshwane *Integrated Development Plan: Revision for 2020/21 and Service Delivery and Budget Implementation (SDBIP) Scorecard* 158-159.

<sup>816</sup> See ss 31 and 34 of the MSA.

<sup>817</sup> Asha and Makalela 2020 *International Journal of Economics and Finance Studies* 4.

capacity issues, and it affects their capability to bring protection plans such as those for microclimate regulation to culmination.<sup>818</sup> Municipalities should further ensure proper integration between the plans and frameworks in their IDPs as improper integration will result in fragmentation and ineffective implementation of planning and development mandates. Improper integration will also result in the subsequent failure to realise plans for the protection of microclimate regulation services or other objectives envisioned by the urban municipality.<sup>819</sup>

#### 4.3.1.2 SDFs

SDFs of municipalities form part of the components of their IDPs and are considered to be the principal spatial planning instrument in the municipal planning framework.<sup>820</sup> Municipal SDFs are adopted via notice in the relevant province's Provincial Gazette by the Municipal Council of the municipality after a rigorous process as set out in the SPLUMA has been followed.<sup>821</sup> The SDF should refer to and reveal the current state of affairs in the municipality's demarcated area and its desired land use patterns.<sup>822</sup> The state of affairs in the municipal boundaries may arguably also contain the state of the urban ecosystem services in the city, inclusive of ecosystems that provide microclimate regulation services. Furthermore, the municipal SDF informs the IDP of, *inter alia*, the spatial considerations related to the spatial development vision and plan;<sup>823</sup> the integration and trade-offs of relevant sector policies and plans; guidelines for planning and development decisions and discretions; planned approaches to spatial development; risks of spatial patterns of growth and development; environmental management instruments that apply; and the outcomes of public participation in the

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<sup>818</sup> Asha and Makalela 2020 *International Journal of Economics and Finance Studies* 5.

<sup>819</sup> Asha and Makalela 2020 *International Journal of Economics and Finance Studies* 4-5.

<sup>820</sup> Sections 5 and 20 of the SPLUMA; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 234.

<sup>821</sup> This process requires a municipality to, firstly, give notice in the Provincial Gazette of the proposed adoption of the SDF, after which a process for public participation must be allowed and representations received and considered - s 20(3) of the SPLUMA.

<sup>822</sup> Sections 19(c) and (d) of the SPLUMA.

<sup>823</sup> SPLUMA holds that the SDF must include "a written and spatial representation of a five-year spatial development plan for the spatial form of the city" denoting the short-term planning of the municipality. Following this provision, the SPLUMA determines that the SDF also has to contain a longer-term spatial development vision statement indicating the desired spatial growth and development pattern for the municipality for the following 10 to 20 years, thereby elucidating that the municipality is required to do long-term planning as well – See ss 20(b) and (c) of the SPLUMA.

urban municipality.<sup>824</sup> In addition, the municipal SDF must be aligned with the development principles and norms and standards in section 2 of SPLUMA as well as the policies, plans, programmes and planning legislation of the other spheres of government.<sup>825</sup> The municipal SDF also provides guidance on how it should be implemented.<sup>826</sup>

Importantly, SPLUMA holds that the municipal SDF must comply with environmental legislation and guide and inform an urban municipality on the conservation of the built and natural environment. It emphasises the need for incorporation of the environment and environmental concerns into the planning frameworks of the local sphere of government.<sup>827</sup> In addition to promoting compliance with environmental legislation, the SPLUMA also requires the inclusion of a strategic assessment of the environmental pressures and opportunities within the municipal area, including the spatial location of environmental sensitivities and ecosystem services like microclimate regulation.<sup>828</sup> Municipalities are also required to include a spatial development plan for the spatial form of the municipality in such frameworks.<sup>829</sup> To be included is also the purpose, desired impact and structure of the land use management scheme of that municipal area, as well as an implementation plan on sectoral requirements, implementation targets and monitoring indicators for compliance measurement is needed.<sup>830</sup> Among other things, SDFs allow municipalities to identify environmental vulnerabilities that need attention in their planning and development strategies in order for them to perform their duties and realise environmental protection through planning mechanisms. Several urban municipalities make provision in their SDFs for environment related improvements and responses to specifically address climate change that affects the city at a local level and that may contribute to lower urban

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<sup>824</sup> Sections 12(1) and 19 of the SPLUMA.

<sup>825</sup> Sections 19(a) and (b) of the SPLUMA.

<sup>826</sup> Section 19(f) of the SPLUMA.

<sup>827</sup> Section 19(g) of the SPLUMA. See also the *Le Sueur*-case para 36.

<sup>828</sup> Section 21(j) of the SPLUMA. See also reg 2(4)(f) in GN R 796 in GG 22605 of 24 August 2001

<sup>829</sup> Section 21(b) of the SPLUMA.

<sup>830</sup> See ss 21(o) and (p)(i) and (iv) of the SPLUMA.

temperatures and the protection of microclimate regulation services.<sup>831</sup> This instrument resultantly enables municipalities to contribute to the protection of microclimate regulation ecosystem services in their urban municipal area.

There are several vital issues that urban municipalities face with regards to the formulation and implementation of their municipal SDFs. These issues, similar to the challenges identified above for IDPs, include limits on financial resources and overall capacity of urban municipalities in respect of the implementation of municipal SDFs, even though urban municipalities are better capacitated than rural ones.<sup>832</sup> Alignment issues may also occur if proper integration is not ensured and if there is no cooperation between urban municipalities and the other spheres of government and line functionaries.<sup>833</sup> Additionally, municipalities may face issues regarding the lack of spatially relevant information on which they are required to base their planning instruments such as municipal SDFs. They may also face technical challenges in respect of the extensive list of requirements that SDFs are required to comply with.<sup>834</sup> These issues may hinder urban municipalities in sufficiently planning for all aspects as required by law and may even lead to inadequate planning in terms of protection requirements for microclimate regulation services.<sup>835</sup>

#### 4.3.1.3 LUS

As part of their planning and development mandates discussed above,<sup>836</sup> municipalities are obligated through the law to adopt and approve LUSs for their urban municipal areas.<sup>837</sup> An LUS is a legally binding document, as stated earlier,<sup>838</sup> and is intended to regulate how and for what purposes property in the confines of the municipal area are used.<sup>839</sup> They are intended to do so for purposes of promoting economic growth, social

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<sup>831</sup> See for instance City of Tshwane *Regionalized Municipal Spatial Development Framework, 2018 Region 3* 68-72 and 104; City of Johannesburg: Department of Development Planning *City of Johannesburg Metropolitan Municipality Spatial Development Framework 2040* 33-35.

<sup>832</sup> SACN *SPLUMA as a Tool for Spatial Transformation* 37.

<sup>833</sup> SACN *SPLUMA as a Tool for Spatial Transformation* 40.

<sup>834</sup> SACN *SPLUMA as a Tool for Spatial Transformation* 40.

<sup>835</sup> SACN *SPLUMA as a Tool for Spatial Transformation* 40.

<sup>836</sup> See para 4.2 above.

<sup>837</sup> Section 24(1) of the SPLUMA.

<sup>838</sup> See para 3.2.2.2.2 above.

<sup>839</sup> Van Wyk "The Law on Planning and the Environment" 1151.

inclusion, and efficient land development. Perhaps most notably in the context of this study, LUSs are also intended to promote minimal impact on the environment and natural resources, and thus on urban ecosystem services.<sup>840</sup>

It is through the use of an LUS, zoning, and policies that municipalities may demarcate areas and create zones within urban municipal areas in terms of which specific activities or uses are restricted depending on the purpose of the property in question.<sup>841</sup> A practical example of this can be found in eThekweni's LUS which sets out the intended purpose of earmarking publicly-owned land as conservation zones and ensuring the management of natural areas for the ecosystem services that these areas provide and, further, determines activities that may not be conducted on such land.<sup>842</sup> An LUS has to comply with the requirements outlined in the SPLUMA, according to which an LUS must contain "appropriate categories of land use zoning and regulations".<sup>843</sup> An LUS also has to be drafted for areas that do not have an existing LUS.<sup>844</sup>

Besides the aforementioned requirements, SPLUMA further instructs that an LUS has to pay due regard to any environmental management instrument drafted by the relevant environmental management authority and that it must comply with environmental legislation.<sup>845</sup> This requirement, like the one for SDFs and the provision mentioned previously concerning the promotion of the environment and natural resources, brings environmental concerns and the protection of the environment into the scope of planning in municipalities, enabling the local sphere of government to realise their duties in terms of the environmental protection, which includes ecosystem services and the protection of microclimate regulation services.<sup>846</sup> This argument is

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<sup>840</sup> Section 25(1) of the SPLUMA.

<sup>841</sup> Van Wyk "The Law on Planning and the Environment" 1151. Land use schemes are in some instances also known as zoning schemes. See also para 3.2.2.2.2 above.

<sup>842</sup> eThekweni Municipality *Central Scheme of eThekweni Municipality* 41. See also eThekweni Municipality *Inner West Scheme* 55; eThekweni Municipality *North Scheme* 60; eThekweni Municipality *Outer West Scheme* 56; eThekweni Municipality *Reservoir Hills Scheme* 51; eThekweni Municipality *South Scheme* 60.

<sup>843</sup> Section 24(2)(a) of the SPLUMA.

<sup>844</sup> Section 24(2)(a) of the SPLUMA.

<sup>845</sup> Section 24(2)(b) of the SPLUMA.

<sup>846</sup> See paras 3.1 and 4.2 above on the role of local government in the environmental rights discourse.

supported by the court in the Le Sueur-case. The court held correctly that environmental protection cannot be separated from the municipal planning mandates of local governments like the eThekweni Municipality and that the zoning of land for certain purposes, including environmental conservation, remained a part of municipal planning.<sup>847</sup> SPLUMA further provides that the LUS of an urban municipality must include land use and development incentives to encourage effective implementation of SDFs and other development policies. This provision relates closely to the discussion above on the use of incentives as a way to ensure compliance and enforcement with environmental laws and regulations, and as a way of enhancing environmental protection.<sup>848</sup>

An LUS should also set out provisions that encourage the effective enactment and implementation of national and provincial policies, municipal SDFs, and IDPs.<sup>849</sup> Furthermore, an LUS should encompass scheme regulations, zoning maps illustrating the land use zones of the urban municipal area, and a register of any amendments to the particular LUS.<sup>850</sup> Besides the mandatory requirements, municipalities also have the discretion of adding provisions to their LUS regarding use and development of urban land for which the municipality's consent is required. In addition, an LUS may contain specific requirements in respect of any identified municipal special zones addressing development priorities, as well as the variation of conditions relating to the use, size and scale of buildings in the urban area, and the intensity and density of land use in a municipal area.<sup>851</sup> In terms of enforcing the LUS, a municipality may, in terms of section 32 of SPLUMA, pass municipal by-laws aimed at the enforcement of the LUS<sup>852</sup> and launch investigations into non-compliance with such LUS.<sup>853</sup>

Challenges that may potentially hinder the enforcement of an LUS and lead to a failure to plan appropriately for the protection of microclimate regulation include inconsistent enforcement of land use legislation and disregard for planning legislation in urban

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<sup>847</sup> Le Sueur-case paras 21-22.

<sup>848</sup> See para 3.2.5 above.

<sup>849</sup> Sections 24(f) and (g) of the SPLUMA.

<sup>850</sup> Section 25(2) of the SPLUMA.

<sup>851</sup> Section 24(3) of the SPLUMA.

<sup>852</sup> Section 32(1) of the SPLUMA.

<sup>853</sup> Section 32(3) of the SPLUMA.

areas.<sup>854</sup> Land is a very contentious issue in South Africa due to past racial disparities and land management under apartheid, which makes the enforcement of LUSs more difficult especially insofar as the informal and illegal use of land in cities is concerned.<sup>855</sup> Furthermore, land use changes should be carefully considered as changes in land use also affect ecosystems and ecosystem services such as microclimate regulation.<sup>856</sup> In a similar vein to IDPs and SDFs, municipal incapacity and a lack of technical skills and acumen is a concern in respect of LUSs.<sup>857</sup> All of these challenges hinder the implementation and enforcement of LUSs. These challenges may lead to the inappropriate zoning of land for development purposes or even for conservation purposes if the zoned area is not suitable for or susceptible to the purpose it is zoned for. Furthermore, incorrect zoning in this way may affect the environment or natural resources, which may lead to the ineffective protection of microclimate regulation services in urban municipal areas.<sup>858</sup>

#### 4.3.2 *By-laws*

As part of its legislative powers, the local sphere of government has the competence and legislative authority to draft and adopt environmental by-laws which will be applicable in the jurisdiction of a specific urban municipality.<sup>859</sup> Such municipal by-laws may not contravene legislative provisions set out in national legislation or the relevant province's adopted provincial legislation and are subject thereto. However, they may contain stricter provisions that apply for the relevant urban municipal area.<sup>860</sup> A by-law is an enforceable instrument with which the urban community in the jurisdiction of the relevant municipality must comply.<sup>861</sup> The passing and implementation of municipal by-laws are ways in which the municipality exercises its legislative and executive authority.<sup>862</sup> The contravention of or failure to comply with municipal by-laws may

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<sup>854</sup> Nel 2016 *Urban Forum* 81.

<sup>855</sup> Nel 2016 *Urban Forum* 81.

<sup>856</sup> Bryan 2013 *Environmental Science and Policy* 126.

<sup>857</sup> Nel 2016 *Urban Forum* 82.

<sup>858</sup> See Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 191.

<sup>859</sup> Sections 43(c) and 156(2) of the Constitution. See also Olivier "Co-operative Government and the Intergovernmental Division of Environmental Powers and Functions" 347.

<sup>860</sup> Section 156(3) of the Constitution.

<sup>861</sup> Section 5(2)(e) of the MSA.

<sup>862</sup> Sections 11(3)(e) and (m) of the MSA.

result in the institution of criminal proceedings and imprisonment or the imposition of a fine.<sup>863</sup>

NEMA contains provisions regarding model environmental management by-laws, which are example by-laws framed by the Minister.<sup>864</sup> An urban municipality may decide to adopt such an example by-law as its municipal by-law, with alterations specific to its particular urban context and needs.<sup>865</sup> As envisioned in the NEMA, model environmental by-laws concern procedures for the management of the impact that development may have on the environment.<sup>866</sup> At the heart of these by-laws is the goal to "mitigate adverse environmental impacts", which include the degradation of ecosystems to a magnitude where their capacity to provide essential ecosystem services is impaired.<sup>867</sup> Furthermore, municipal by-laws may be used to set norms and standards with which existing and new authorised activities and developments in the relevant urban area must comply.<sup>868</sup> They also serve the purpose of guaranteeing "effective environmental management and conservation of resources and impact [in municipalities] in cooperation with other organs of state."<sup>869</sup>

Urban municipalities may promulgate, revise and enforce municipal environmental by-laws for purposes of imparting legislative measures needed to attain compliance from their constituents as well as administering and managing aspects that fall within their constitutional mandates, including environmental protection mandates.<sup>870</sup> By-laws are a common occurrence in many of the sector-specific acts. A prime example of such by-law making powers of municipalities occurs in the NEMAQA which provides that municipalities may set standards for point, non-point, and mobile emission sources in respect of certain substances that they have identified.<sup>871</sup> This provision in NEMAQA enables urban municipalities to set emission standards. In so doing, it enables them

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<sup>863</sup> Section 112(a) of the MSA. See also item 5 of Schedule 3 of the MSA.

<sup>864</sup> Section 46(1) of the NEMA.

<sup>865</sup> Section 46(1) of the NEMA. See also Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 119.

<sup>866</sup> Section 46(1) of the NEMA.

<sup>867</sup> Section 46(4)(a) of the NEMA. See also paras 1.1 and 2.1 above.

<sup>868</sup> Section 46(4)(b) of the NEMA.

<sup>869</sup> Section 46(4)(c) of the NEMA.

<sup>870</sup> See s 156(2) of the Constitution.

<sup>871</sup> Section 11(1) of the NEMAQA.

to use their legislative authority to realise the protection of microclimate regulation services and the protection of city ecosystems by promoting lower emissions and pollution.<sup>872</sup> These standards, which will apply to the respective urban municipal area of the municipality, must be in line with standards at a national and provincial level, but may once again be more stringent.<sup>873</sup> Another way in which municipalities can use by-laws for the protection of microclimate regulation is by formulating their by-laws towards a specific conservation purpose or a specific element that contributes to microclimate regulation in urban areas. This method was used by the Ekurhuleni Municipality in their by-law concerning street trees and how these trees must be managed, maintained, and removed.<sup>874</sup> Trees are contributors to microclimate regulation services in cities<sup>875</sup> and the Ekurhuleni Municipality used the Street Tree By-law to include consequences and penalties for damage to or removal of trees and measures for the protection of such trees in its urban area.<sup>876</sup> As informed by the discussion above, the provision for and protection of such trees, as a part of ecosystems that deliver ecosystem services in cities, contribute towards the protection of microclimate regulation.<sup>877</sup>

To advance cooperative government between urban municipalities and other organs of state, a consultative process must be followed before the enactment of such by-laws.<sup>878</sup> In further relation to the by-law making powers of municipalities, the NEMPAA holds that activities in local protected areas may be regulated and restricted through the adoption of municipal by-laws and that the management authority of such protected areas must manage the relevant areas in accordance with applicable municipal by-laws.<sup>879</sup>

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<sup>872</sup> See para 2.4 above.

<sup>873</sup> This means that a municipality may not deviate from the standards set at national or provincial level, but they may impose additional and stricter standards – s 11(2) of NEMAQA.

<sup>874</sup> See Ekurhuleni Metropolitan Municipality *By-laws for the Planting, Pruning, Removal and Treatment of Street Trees* 2-5 (hereafter the Ekurhuleni Municipality Street Tree By-law).

<sup>875</sup> See para 2.3.3 above.

<sup>876</sup> See Ekurhuleni Metropolitan Municipality *Ekurhuleni Municipality Street Tree By-law* 5-6.

<sup>877</sup> See para 2.4 above.

<sup>878</sup> Section 11(4) of the NEMAQA.

<sup>879</sup> Sections 49(c) and 40(1)(b)(iv) of the NEMPAA.

Just like with the IDPs, SDFs and LUSs above,<sup>880</sup> a lack of alignment of by-laws with other national and provincial legislation leads to fragmentation and indicates a lack of effective co-operative governance efforts.<sup>881</sup> It is also crucial for municipalities to have up to date and efficient by-laws to ensure that they meet their local environmental governance function.<sup>882</sup> This is so that urban constituents are clear on what the by-laws hold in terms of microclimate regulation ecosystem services protection, for example. Furthermore, in many instances, by-laws are not adequately enforced and implemented because of the lack of capacity to police municipal by-laws.<sup>883</sup> If these challenges are resolved, by-laws will doubtfully be enabling instruments in the effort to protect microclimate regulation services or effect environmental governance.

#### **4.4 Other Local Environmental Governance Instruments**

Du Plessis<sup>884</sup> describes local environmental governance (LEG) as the management process by which local government and communities regulate human activities and the effects they have on the environment through the use of formal and informal institutions, legally mandated processes and mechanisms to promote the interests of the current and future generations. The author states further that such processes may pertain to the use of a variety of measures that may be employed by the local sphere of government to stimulate sustainable behaviour within the community.<sup>885</sup>

LEG instruments are thus instruments to be used by urban municipalities to motivate and facilitate action concerning the environment and sustainability within their urban municipal area. They may arguably hold benefits for the protection of microclimate regulation services in cities.<sup>886</sup> The categorisation of LEG instruments based on their root-function, as suggested by Nel, Du Plessis and Du Plessis<sup>887</sup> is followed in this study

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<sup>880</sup> See para 4.3.1-4.3.3 above.

<sup>881</sup> Wessels "Environmental By-Laws - The Missing Link of Integrated Environmental Management" 4.

<sup>882</sup> Wessels "Environmental By-Laws - The Missing Link of Integrated Environmental Management" 11.

<sup>883</sup> Rauch, Shaw and Louw *Municipal Policing in South Africa: Development and Challenges* 3.

<sup>884</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Sphere of Government* 156.

<sup>885</sup> Du Plessis *Fulfilment of South Africa's Constitutional Environmental Right in the Local Sphere of Government* 156.

<sup>886</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 91-92.

<sup>887</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 92.

as it is a functional, comprehensive, and easily comprehensible categorisation, in line with the powers and functions of municipalities. This typology by Nel, Du Plessis and Du Plessis (the NDD-typology) is arguably a more user-friendly typology compared to other available typologies identified by the authors. These typologies include the typology consisting of substantive, procedural and structural instruments and the typology that considers instruments in terms of their spatial/geographical, political or own performance nature suggested by Erdmenger; or the Plan-Do-Check-Act and Reporting typology.<sup>888</sup> The NDD-typology further outlines the exact type of instruments that can be expected to be found in each category. The three base categories of the NDD-typology are compliance-, governing- and governance-based instruments. The authors have also conveniently created a category for instruments that are multifunctional and do not fit into a singular category, but which has more than one application, namely cross-cutting LEG instruments. These categories are discussed below along with the instruments relevant to ecosystem protection, and that may be applied to the protection of microclimate regulation.

#### *4.4.1 Compliance-based Instruments*

Municipalities are governed entities as they are regulated and governed by other organs of state in the national and provincial spheres of government. This means that there are legal requirements at the national and provincial levels of government that municipalities have to comply with.<sup>889</sup> In the context of environmental protection, the legal requirements with which municipalities must comply come in many shapes and forms, including specific environmental duties; activities or processes that need authorisation or permissions from other organs of state, reporting, and monitoring.<sup>890</sup> Municipalities must keep track of these legal requirements that affect them and in terms of requirements to act to ensure that they do not default on their duties. This may be done by use of a legal register which is regularly updated.<sup>891</sup> Besides the requirements from the national and provincial government, certain environmental

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<sup>888</sup> See Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 97.

<sup>889</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 101.

<sup>890</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 102, 106.

<sup>891</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 101.

duties imposed upon municipalities may also entail that urban municipalities use specific instruments.<sup>892</sup>

Apart from meeting legal requirements, municipalities need to ensure management of authorisations, permits and licenses for activities that they conduct. They must adhere to timeframes, comply with reporting requirements in terms of such permissions and ensure general compliance with these instruments. Compliance management is necessary, not only concerning authorisations but also with environmental legislation in general. Compliance management can be done through the use of instruments like environmental management plans,<sup>893</sup> compliance plans, legal compliance audits, inspections, and performance monitoring.<sup>894</sup> Monitoring is a useful instrument for urban municipalities. It has the ability to help municipalities collect data, which then needs to be interpreted and analysed to make it presentable as information that can be used by the applicable municipalities to identify strengths and weaknesses and the quality of their duties, services and progress in terms of environmental protection and legal compliance.<sup>895</sup> By using monitoring measures, urban municipalities will, therefore, be able to easily identify shortcomings about their performance in the realisation of their mandate to protect the environment and effect protection for microclimate regulation services. Suppose an urban municipality is unsuccessful in complying with the predetermined conditions; such municipality may be required to adopt and use additional LEG instruments that serve to remedy the transgression.<sup>896</sup> In severe circumstances of non-compliance or failure to fulfil their mandate, it may be possible to institute proceedings against an organ of state such as an urban municipality for environmental law transgressions and non-compliance after all other remedies have

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<sup>892</sup> This could, for example, include environmental record-keeping, compliance in terms of set norms and standards, monitoring instruments like audits, and reporting instruments- Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 102-105.

<sup>893</sup> See para 3.2.3.2 above.

<sup>894</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 107.

<sup>895</sup> Monitoring is usually prescribed by law, regulation, as part of the national standards or as a requirement in permit authorisations - Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 108.

<sup>896</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 109.

been exhausted.<sup>897</sup> It is gleaned from this discussion that municipal compliance with the law and its mandates is an important factor in LEG.<sup>898</sup>

It is, however, important to keep in mind that there are systemic challenges that cause non-compliance by urban municipalities with the aforementioned requirements, law or specified environmental duties. These challenges include, *inter alia*, the lack of special or technical expertise that is needed for drafting legislation, policies, the IDP, SDF, and LUS.<sup>899</sup> In addition, the challenges include capacity and budget constraints to implement and enforce legislation;<sup>900</sup> as well as coordination and alignment issues paired with inadequate cooperative governance.<sup>901</sup>

#### 4.4.2 Governance-based Instruments

In contrast to the above, municipalities also have the authority to plan, govern and regulate their own processes and functions and ensure that their duties are discharged lawfully and responsibly.<sup>902</sup> It does so, first and foremost, through municipal integrated planning by use of an IDP as discussed in detail above.<sup>903</sup> Other governance-based instruments include the use of performance management, budgeting and funding, supply chain management, human resource management as well as internal auditing.<sup>904</sup> However, for purposes of this study, only some of these may have a bearing on the protection of ecosystems and microclimate regulation and subsequently form the basis of this discussion.

Firstly, in terms of performance management, the MSA provides that municipalities must establish a performance management system (PMS) in line with its resources and best suited to its circumstances.<sup>905</sup> The PMS must be in line with the priorities,

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<sup>897</sup> An example of such instance can be found in s 24F of NEMA. See also Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 110; para 3.3.2 above.

<sup>898</sup> Nel, Du Plessis and Retief "Key Elements for Municipal Action" 44.

<sup>899</sup> Du Plessis 2009 *SAPL* 91-92.

<sup>900</sup> Mngoma, Pillay and Reddy 2011 *African Journal of Public Affairs* 115-116.

<sup>901</sup> Mngoma, Pillay and Reddy 2011 *African Journal of Public Affairs* 115-116.

<sup>902</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 110.

<sup>903</sup> See paras 3.2.2.1 and 4.3.1.1 above.

<sup>904</sup> See Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 111.

<sup>905</sup> Section 38(a) of the MSA.

objectives, indicators and targets of the IDP of the relevant municipality.<sup>906</sup> This system is intended to administer the activities of the municipality in a way that is "economical, effective, efficient and accountable".<sup>907</sup> The PMS is dependent on the establishment of key performance indicators and targets to measure the performance of the municipality. The performance of the municipality speaks to the outcomes and impact of the development priorities and objectives of the municipality contained in its IDP.<sup>908</sup> In the present context, urban municipalities may use the PMS to establish performance management targets relating to their response and actions towards protection ecosystem services and realising protection of particularly microclimate regulation in their demarcated urban municipal boundaries. Where municipalities fall short of their targets or do not meet their key performance indicators, they should take steps to improve on their performance in relation to the target deficiencies.<sup>909</sup> The PMS can subsequently outline the shortcomings of urban municipalities concerning their ecosystem protection targets and objectives related particularly to microclimate regulation services. Municipalities are, furthermore, required to partake in regular reporting, which holds them accountable in terms of the objectives and targets that they set, including those for ecosystem protection.<sup>910</sup> The PMS may be used to verify the performance of the municipality in respect of LEG. This elucidates that the PMS enables municipalities to identify performance areas, in general, and specifically in terms of their duties of environmental performance, where they are lacking and where their attention should be directed to, with corrective measures.

Secondly, funding and budgeting play an imperative role in the performance of functions of the municipality as it determines the capacity of the municipality to perform in terms of their duties in respect of, *inter alia*, LEG and the protection of microclimate regulation ecosystem services in the city.<sup>911</sup> Funding is described as a

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<sup>906</sup> Section 38(a) of the MSA.

<sup>907</sup> Section 38(c) of the MSA.

<sup>908</sup> Section 41(1)(a) of the MSA.

<sup>909</sup> Section 41(1)(d) of the MSA.

<sup>910</sup> Section 41(1)(e) of the MSA.

<sup>911</sup> The budgetary and financial planning processes as well as the coordination of those processes with those organs of state in other spheres of government is provided for in the *Local Government: Municipal Finance Management Act* 56 of 2003 (hereafter the MFMA); Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 113.

"key enabler" for municipalities which are dependent on national, provincial and other funding sources for monetary funding to use for the implementation of their commitments in terms of their IDP.<sup>912</sup> Nel, Du Plessis and Du Plessis suggest that "combination-instruments" consisting of both funding and environment tools may be implemented to form instruments such as environmental accounting and budgeting, that may be adopted by local authorities.<sup>913</sup> Instruments like environmental budgeting enable the municipality to achieve environmental targets and perform their duties as is legally required from them.<sup>914</sup> Using environmental budgeting and accounting has the potential to elevate environmental matters to a higher level of concern worthy of being considered and reported on.<sup>915</sup> However, caution should be exercised when using environmental accounting or budgeting and ascribing economic value to ecosystem services as the possibility exists that some ecosystem services may be grossly undervalued which may be detrimental to conservation and protection efforts.<sup>916</sup> The challenges mentioned earlier for compliance-based instruments should also be observed here. This is mainly because they concern capacity constraints and budget needs of urban municipalities for the implementation of the duties and internal governing processes, as well as the realisation of their targets and objectives in terms of the PMS.<sup>917</sup> Capacity constraints in relation to performance and the skill and human resources of the municipality may also hinder the implementation of the municipal duties expected from the municipality.<sup>918</sup>

#### *4.4.3 Governing-based Instruments*

Urban municipalities are also required to regulate and govern the local communities within their jurisdiction. To regulate these local communities for purposes of ensuring LEG and environmental protection, municipalities have four categories of instruments

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<sup>912</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 113.

<sup>913</sup> The International Council for Local Environmental Initiatives' (ICLEI) EcoBudget® programme is an example of environmental budgeting – See ICLEI (date unknown) <https://webcentre.ecobudget.org/about-ecobudget/>.

<sup>914</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 114.

<sup>915</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 114.

<sup>916</sup> See the critique on the valuation of ecosystem services discussed in para 2.3.2 above in this regard.

<sup>917</sup> See para 4.4.1 above. See also Mngoma, Pillay and Reddy 2011 *African Journal of Public Affairs* 115-116.

<sup>918</sup> Mngoma, Pillay and Reddy 2011 *African Journal of Public Affairs* 115-116.

at their disposal.<sup>919</sup> These categories include command and control-based instruments, incentive-based instruments, agreement-based instruments, and last but not least, rights and civil-based instruments. The majority of the instruments in these categories have been discussed at length in a general sense in the preceding chapter. The discussion in this part of the study, therefore, pertains to the specific use of these instruments by city authorities. Moreover, consideration is given as to whether the specific instruments enable or hinder the protection of ecosystem services and, particularly microclimate regulation services.

#### 4.4.3.1 Command and Control-based Instruments

Command and control-based instruments are of particular use to municipalities in their governance efforts of regulating the behaviour of their constituents and enforcing compliance with laws and regulations within the urban municipal area.<sup>920</sup> These instruments include measures related to the legislative competence of municipalities to promulgate and enforce municipal by-laws as well as local standards.<sup>921</sup> As discussed above,<sup>922</sup> municipalities may adopt municipal by-laws in terms of the MSA as one of the ways to exercise their legislative authority and regulate the areas listed in schedules 4B and 5B of the Constitution.<sup>923</sup> The legislative competence of urban municipalities to promulgate law enables municipalities to create provisions in their policies and by-laws that promote the protection of microclimate regulation services in their urban municipal area as seen in the Ekurhuleni Municipality Street Tree By-law.<sup>924</sup> Additionally, these command and control instruments pertain to the enforcement authority of the municipality and the exercise of their duties within their area of jurisdiction.<sup>925</sup>

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<sup>919</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 116.

<sup>920</sup> Section 151(3) of the Constitution. See also Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 117.

<sup>921</sup> Section 11(3)(m) of the MSA.

<sup>922</sup> See para 4.3.2 above.

<sup>923</sup> This includes the adoption of standard draft environmental by-laws, model environmental management by-laws and by-laws as provided for by sector-specific legislation – see Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 118; Section 11(3)(m) of the MSA; Schedules 4B and 5B of the Constitution.

<sup>924</sup> See para 4.3.2 above.

<sup>925</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 117.

In respect of the enforcement of adopted municipal by-laws and other environmental legislation applicable to local government, there are a number of instruments available that urban municipalities may use to ensure enforcement of these laws and by-laws.<sup>926</sup> The instruments feature the formation of municipal police services and municipal courts with the competence to enforce municipal environmental by-laws, and operate in the jurisdiction of the municipality and adjudicate on municipal matters, respectively.<sup>927</sup> Many urban municipalities, such as the City of Tshwane, the Ekurhuleni Metropolitan Municipality and the City of Johannesburg, have established municipal police services to, among other things, enforce their by-laws.<sup>928</sup> Prosecutions and the initiation of proceedings are allowed in instances where there was a contravention of a by-law or regulation of the municipality, or contravention of other legislation that is administered by such municipality or legislation determined by the National Director of Public Prosecutions.<sup>929</sup> The suite of environmental legislation allows municipalities to take appropriate measures to prevent damage to the environment; ensure that microclimate regulation services are protected; recover damages for the harm caused in line with the polluter pays principle;<sup>930</sup> issue directives to direct a person to cease a harmful activity or take steps to eliminate or prevent harm or rehabilitate the environmental harm suffered as a result of an activity that may have a detrimental effect on the environment and ecosystem services.<sup>931</sup> There are many command and control instruments available that enable municipalities to enforce environmental law provisions. These instruments can assist municipalities in realising protection of

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<sup>926</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 121.

<sup>927</sup> See ss 166(e) and 205(1) of the Constitution; s 64A(1) of the *South African Police Services Act* 68 of 1995; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 121; Molaiwa *Municipal Courts and Environmental Justice in South African Local Government* 35.

<sup>928</sup> See City of Tshwane 2015 <https://bit.ly/3ah5KkP>; City of Ekurhuleni 2019 <https://bit.ly/2WkW4O7>; City of Johannesburg 2018 <https://bit.ly/2IUG0iM>.

<sup>929</sup> These prosecutions are to be done by an authorised staff member of a municipality so authorised in terms of section 22(8)(b) of the *National Prosecuting Authority Act*, 1998 - See s 112 of the MSA; s 22(8)(b) of the *National Prosecuting Authority Act* 32 of 1998; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 122.

<sup>930</sup> Section 2(4)(o) of NEMA provides for the polluter pays principle which determines that the party responsible for environmental harm, pollution, or degradation has the burden of paying for the remediation of such damage caused. It can be a particularly helpful incentive to encourage environmental protection and decline of pollution, especially in cities where pollution is a big environmental threat and a contributor to the heat island effect.

<sup>931</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 122-123.

microclimate regulation services to address urban heating and assist in decreasing the urban heat island effect in urban areas.

Like the instruments in the preceding parts of this chapter,<sup>932</sup> there are also identifiable challenges in respect of command-and-control instruments. These challenges also concern the capacity of urban municipalities in the enforcement of the instruments that form part of the command and control instruments that are required by law.<sup>933</sup> Other weaknesses of command and control instruments include, *inter alia*, difficulties in the enforcement of laws and municipal by-laws due to inadequate policing, administrative complexities, the proliferation of laws each with different requirements needed from different departments instead of a consolidated entity which leads to fragmentation.<sup>934</sup> Despite all of the opportunities that exist through command and control instruments as compulsory and legally determined instruments, these challenges may cause difficulty in respect of the enforcement of the above instruments. Improper implementation and enforcement of these instruments may cause a barrier to achieve and realise the protection of microclimate regulation services in urban municipal areas.

Nel, Du Plessis and Du Plessis hold that command-and-control instruments cannot function in isolation and other instruments need to be adopted alongside these to ensure sustainability.<sup>935</sup> These complementary instruments may include incentives, agreements and civil-based instruments.

#### 4.4.3.2 Incentive-based Instruments

A variety of possible incentives and their uses was discussed at length above.<sup>936</sup> Building on that discussion, it is gleaned that municipalities, like other spheres of government and organs of state, have the capability of changing the behaviour of their constituents through the introduction of incentives or disincentives.<sup>937</sup> Incentives

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<sup>932</sup> See paras 4.4.1-4.4.3 above.

<sup>933</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 125.

<sup>934</sup> Nel and Wessels 2010 *PELJ* 52-53.

<sup>935</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 125.

<sup>936</sup> See para 3.2.5 above.

<sup>937</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 125.

encourage changes in behaviour and are either positive or negative in the sense that they award good behaviour and activities, while punishing bad behaviour and practices.<sup>938</sup> Incentives also have different forms and can be either fiscal or non-monetary.<sup>939</sup> Incentives are deemed to act as a motivating factor for constituents to improve upon their environmental practices. The application of especially financial incentives and disincentives is a popular mechanism to appeal to the self-interest of the people or companies that are under the regulatory control of the urban municipality.<sup>940</sup> It is argued that these instruments give municipalities a chance to consider their rates and taxes, as these instruments are adjustable to the required outcome a municipality desires.<sup>941</sup> Municipalities can implement these instruments *vis-à-vis* policies in which they may identify circumstances in which rebates, deductions or exemptions may be awarded.<sup>942</sup> Rebates and tax deductions, in this context, may be awarded on the money expended on conservation-related activities pertaining to the protection of microclimate regulation ecosystem services specifically, in the context of this study, or for donations towards such protection efforts meaning that complying persons will be able to save money if they undertake such initiatives.<sup>943</sup> Also, in their policies, urban municipalities may provide for reduced taxes or exemptions from property taxes where persons are employing sustainable land use practices or where they transformed their property into protected areas for purposes of protecting microclimate regulation services.<sup>944</sup> The municipality may, additionally, provide grants or financial subsidies for activities and initiatives that have microclimate regulation protection and aim where it would be economically viable for them to do so.<sup>945</sup>

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<sup>938</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 125. See also para 3.2.3 above.

<sup>939</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 125.

<sup>940</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 126.

<sup>941</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 126.

<sup>942</sup> Paterson "Incentive-based Measures" 300; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 126-127.

<sup>943</sup> Paterson "Incentive-based Measures" 300.

<sup>944</sup> Paterson "Incentive-based Measures" 300.

<sup>945</sup> Paterson "Incentive-based Measures" 301.

In contrast to the above mentioned, disincentives such as fees, rates, charges, surcharges, and tariffs may be imposed to deter specific behaviour by adding costs thereto.<sup>946</sup> This entails for example that the municipality may levy costs for activities such as the use of non-renewable energy sources, waste disposal, and water-use, that threaten microclimate regulation ecosystem services. They may do this by way of, for example, charging persons responsible for their emissions that contribute to the heat island effect and the anthropogenic heating of cities, as well as the discharge of pollutants that threaten microclimate regulation capabilities of ecosystems.<sup>947</sup> Urban municipalities may correspondingly levy licence fees that parties are obliged to pay to undertake or continue activities that produce high levels of emissions or generate a lot of pollutants and detrimentally affect ecosystem capacity to provide ecosystem services. The municipality may implement these policies by enacting them into by-laws setting out the different rates for different properties or areas.

Another incentive-based instrument that municipalities ought to consider is recognition schemes, which is a way through which acceptable environmental practices and sustainable behaviour are publicly recognised and rewarded.<sup>948</sup> Municipalities may use such schemes innovatively and create recognition schemes that contribute positively and motivate corporations to launch activities or enforce behaviour that enables the protection of microclimate regulation services. This can take the form of regulatory incentives. Regulatory incentives encourage corporations to go beyond what is required by law in their conservation efforts in return for less stringent regulation by the urban municipality.<sup>949</sup> As discussed above, such initiatives lead to competitive corporate behaviour in which companies compete to be more sustainable and environmentally friendly than their competitors, and this inspires corporate social responsibility.<sup>950</sup> It is argued that such initiatives can be altered to fit the desired

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<sup>946</sup> Paterson "Incentive-based Measures" 302; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 126-127.

<sup>947</sup> See Paterson "Incentive-based Measures" 302.

<sup>948</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Governance" 127.

<sup>949</sup> See para 3.2.3 above.

<sup>950</sup> See para 3.2.3 above.

outcomes of the municipalities and be used to, for example, endorse the environmental governance and protection of microclimate regulation services.<sup>951</sup>

Generally, incentive-based instruments are considered more beneficial than command and control instruments as they are perceived to be more economically efficient and relieve the regulatory burden of urban municipalities.<sup>952</sup> As a result, incentive-based instruments also alleviate pressure on the capacity and resource constraints of the urban municipality.<sup>953</sup> A further benefit includes that it generates revenue for environmental management.<sup>954</sup> These instruments enable protection of microclimate regulation as they encourage society to take strides in environmental and ecosystem services protection.

Regardless of the perceived benefits, these instruments should still be used with caution as they may result in perverse incentives which hinder ecosystem services protection as they can unwittingly promote and extend unsustainable behaviour and cause harm to ecosystems.<sup>955</sup> In line with the critique on environmental accounting and budgeting above,<sup>956</sup> incentive-based instruments such as MBI inherently attach a value to goods and services, which may result in these ecosystem services being accorded insufficient value and leading to inadequate consideration in activities that may detrimentally impact the environment, as well as in development and planning decisions.<sup>957</sup> These challenges potentially hinder urban municipalities in realising microclimate regulation for their urban municipal areas as the former creates incentives that are counter-intuitive to their mandate of protecting microclimate regulation services and the latter leads to the undervaluing and subsequent disregard for such ecosystem services.

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<sup>951</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 128.

<sup>952</sup> Paterson "Incentive-based Measures" 307.

<sup>953</sup> Paterson "Incentive-based Measures" 307.

<sup>954</sup> Paterson "Incentive-based Measures" 307.

<sup>955</sup> Paterson "Incentive-based Measures" 301.

<sup>956</sup> See para 4.4.2 above.

<sup>957</sup> Paterson "Incentive-based Measures" 301.

#### 4.4.3.3 Agreement-based Instruments

Agreement-based instruments are established either through legislative requirements, via contracts or on a voluntary basis.<sup>958</sup> Such agreements may trigger the need for monitoring and reporting. Agreement-based instruments are legally binding and damages or specific performance can be claimed for non-compliance. Urban municipalities may, therefore, impose sanctions for non-compliance with the objectives to ensure that such agreements are fulfilled.<sup>959</sup> Urban municipalities may use legally binding agreements such as EMCAs as well as agreements provided for by other legislation in furtherance of the protection objectives of the microclimate regulation services. An urban municipality may enter into an EMCA with any person, company or community for purposes of compliance with environmental legislation and protection of the environment.<sup>960</sup> These agreements are made to the effect that communities or parties to such agreement with the urban municipality undertake to improve upon environmental protection standards. The achievement of agreed upon environmental targets, in the present context, may include efforts to protect microclimate regulation ecosystem services.<sup>961</sup> The municipality can measure compliance with such agreement by requiring periodic monitoring and reporting on performance in respect of the EMCA.<sup>962</sup> Such agreements can create higher levels of environmental awareness and foster improved relationships and mutual trust between the municipality, community, and industry in respect of the protection of microclimate regulation services in the urban municipal area.<sup>963</sup> Agreement-based instruments also help the municipality to ensure compliance with environmental legislation and getting the community to participate in matters concerning the environment and LEG. This may arguably lead to improved protection and consideration of microclimate

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<sup>958</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 129.

<sup>959</sup> Lehmann "Voluntary Compliance Measures" 286; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 129. See also para 3.4.1 above.

<sup>960</sup> See para 3.4 above for a detailed discussion on EMCAs. See also s 35(1) of the NEMA.

<sup>961</sup> Section 35(3) of the NEMA.

<sup>962</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 130; s 35(3) of the NEMA.

<sup>963</sup> Lehmann "Voluntary Compliance Measures" 286; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 130.

regulation ecosystem services.<sup>964</sup> Agreement-based instruments, like EMCAs, have the advantage that they are co-regulated by the urban municipality and by the other party to such agreement, which results in consensual decision-making, cooperative approaches to environmental problem-solving and freedom of corporations regarding how they achieve the targets they set out in the agreement.<sup>965</sup> These are enabling factors that illustrate that urban municipalities may successfully use EMCAs in cooperation with private entities to facilitate the protection of microclimate regulation ecosystem services in city areas. However, the success of agreement-based instruments is dependent on political will and the efficient enforcement of legislation.<sup>966</sup> Where these components are deficient, it is arguable that urban municipalities will have little success in utilising such agreements to further the objective of protecting microclimate regulation.<sup>967</sup>

#### 4.4.3.4 Rights and Civil-based Instruments

Civil-based instruments are used to support urban municipal authorities in the regulation of compliance by the local communities with the environmental law and further promotes accountability of the municipality in LEG.<sup>968</sup> These civil-based instruments are categorised as either structural or procedural.<sup>969</sup> Structural civil-based LEG instruments, as the name suggests, pertains to the formal structures required for participation; while the procedural civil-based LEG instruments entail the processes to ensure participation.<sup>970</sup> Structural, civil-based-instruments require the establishment of formal forums and structures such as advisory<sup>971</sup> or ward committees,<sup>972</sup> or in the environmental protection context sector-specific committees where the procedural

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<sup>964</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 130.

<sup>965</sup> Lehmann "Voluntary Compliance Measures" 284.

<sup>966</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 129.

<sup>967</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 129.

<sup>968</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 131.

<sup>969</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 131.

<sup>970</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 131.

<sup>971</sup> Advisory committees serve the purpose of ensuring the effective and efficient performance of the functions and powers of the municipality - Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 132.

<sup>972</sup> Ward committees may be established in terms of s 73 of the *Municipal Structures Act* and have the objective of enhancing participatory democracy in the local sphere of government in terms of s 72(3) of the *Municipal Structures Act*.

instruments may be implemented.<sup>973</sup> The matters on which such committees can make recommendations include environmental matters such as environmental degradation and the lack of protection in respect of microclimate regulation services.<sup>974</sup> An example of an environmental protection sector-specific committee is found in section 42 of the NEMICMA which provides for the establishment of a municipal coastal committee that may promote integrated coastal management in the municipality.<sup>975</sup> Urban municipalities can use this example as a frame of reference and form a municipal committee that promotes the protection of ecosystem services, including microclimate regulation, and considerations thereof in decision-making procedures.<sup>976</sup> Instruments such as these committees bring together several role players in a way that is inclusive of civil society.

The procedural civil-based instruments include instruments such as public participation, conflict resolution measures and allowance for a civil action and private prosecutions as well as access to information.<sup>977</sup> These instruments facilitate engagement with the public regarding environmental concerns.

Public participation is an important mechanism to enable the community to participate in decision-making processes. It also allows for community participation and enables the municipality to create environmental awareness and improve environmental education that influences the behaviour of the community to be more environmentally conscious. This may result in improved environmental protection and subsequently also the protection of microclimate regulation services.<sup>978</sup> It is further one of the main requirements of the EIA process. In the EIA processes where the municipality is the applicant for authorisation, it has to ensure that a process for public participation is done. In other instances, urban municipalities are also required to participate as a commenting authority. They are required to weigh in on aspects of service delivery to

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<sup>973</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 132-133.

<sup>974</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 132.

<sup>975</sup> See s 42(4) of the NEMICMA.

<sup>976</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 133.

<sup>977</sup> See paras 3.3 and 3.4 above in respect of administrative action which includes the right to access to information and civil-based instruments, respectively; See also Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 134-142.

<sup>978</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 135.

proposed developments or as an interested and affected party on considerations of the SDF, IDP, EMF and spatial plan if the development affects the environment in the municipal area.<sup>979</sup> With its commenting authority, municipalities have the opportunity to ensure that environmental concerns and protection of ecosystem services such as microclimate regulation are taken into account in environmental assessments and decision-making processes.

In addition to public participation, the law also provides for the right of access to information and hence the dissemination of such information. Dissemination is done through voluntary or statutorily required disclosure in the form of, for example, reporting, education and empowerment of stakeholders, and environmental information instruments.<sup>980</sup> As alluded to above in the discussion on public participation, it becomes evident that public participation and environmental education and awareness are closely related in that one's success is dependent on the presence of the other.<sup>981</sup> Environmental awareness and education are additionally dependent on information about the environment.<sup>982</sup> Urban municipalities may need to compile, and make publicly available, information on the relevance and need for ecosystem protection and concomitantly the need for microclimate regulation services and how they may be protected. This may garner environmental awareness and interest in the protection efforts of such urban municipalities in respect of microclimate regulation services. The dissemination of such information not only informs the public and contributes to environmental knowledge regarding ecosystem services and microclimate regulation, but it also keeps the municipality accountable in respect of its duty to protect the environment.

The critical requirements for civil-based instruments are the availability and distribution of information to the public to create awareness and educate them on, in this instance, microclimate regulation ecosystem services and allow them to participate in decision-making processes.<sup>983</sup> This is a hard task if there is an information

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<sup>979</sup> See s 24(4)(a)(v) of the NEMA.

<sup>980</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 140.

<sup>981</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 140.

<sup>982</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 140.

<sup>983</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 134.

or knowledge deficit or a lack of skill and expertise at the municipal level on the relevant topic,<sup>984</sup> which in this case regards microclimate regulation services. The shortcomings in respect of knowledge or information may result in the need for training to ensure that all legal requirements are met, and municipal officials are properly informed and knowledgeable on the relevant topic that they may disseminate accurate information to the public, and comply with legal requirements.<sup>985</sup> In so doing, they also contribute to possible behaviour changes in the local community in respect of the protection of microclimate regulation, through creating awareness and promoting environmental education.

#### *4.4.4 Cross-cutting Instruments*

Over and above compliance, governance and governing-based instruments, other instruments do not effortlessly fit into the categories and descriptions provided above.<sup>986</sup> It is for this reason that Nel, Du Plessis and Du Plessis formulated a fourth category for instruments that do not fit in either or all of the above categories. Cross-cutting instruments are subdivided into spatially based LEG instruments, specific environmental management plans, information-based LEG instruments, and co-operation-based LEG instruments.

Spatially based LEG instruments refer to municipal planning instruments such as the IDP, SDFs and LUS; all of which were discussed above.<sup>987</sup> In reference to environmental management plans, urban municipalities are in instances required to draft and adopt sector-specific environmental management plans.<sup>988</sup> Examples of sector-specific environmental management plans to be drafted by municipalities include water services development plans,<sup>989</sup> integrated waste management plans,<sup>990</sup>

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<sup>984</sup> Deichmann *et al* *Information-based Instruments for Improved Urban Management* 15.

<sup>985</sup> Wessels and Mkhari "Environmental Management Training – A Civil Based Instrument to Ensure Environmental Protection and Legal Compliance: The Mooirivier Mall Case Study" 2-3.

<sup>986</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 143.

<sup>987</sup> See para 4.3 above in this regard.

<sup>988</sup> See para 3.2.3.2 above for a discussion on environmental management plans.

<sup>989</sup> Section 12 of the WSA.

<sup>990</sup> Section 11(4)(a) of the NEMWA.

biodiversity management plans,<sup>991</sup> air quality management plans,<sup>992</sup> and estuarine management plans.<sup>993</sup> Urban municipalities may include considerations of ecosystems and microclimate regulation services where they are required to draft such plans, to the extent which it may be relevant to promote the protection of these services. Considering the discussion in chapter two of this study pertaining to microclimate regulation and how the ecosystem service is provided,<sup>994</sup> urban municipalities may be able to insert considerations of microclimate regulation services into, for example, water services, estuarine and biodiversity management plans as far as the provision relates to water sources and biodiversity and their protection in the relevant urban area. Air quality management plans drafted by urban municipalities may also be the ideal forum in which to include information pertaining to the effect of pollution and emissions on urban ecosystems and the solutions or effects that may result from efforts to protect urban ecosystems and the microclimate regulation services they offer. These plans need to be integrated into the IDP of the applicable urban municipality and need to be aligned with other plans at the national and provincial sphere of government.<sup>995</sup> Failure to properly integrate and align such plans with others contributes to fragmentation, duplication and overlapping and results in the inability of the urban municipality to effectively implement and enforce such environmental management plan.<sup>996</sup>

Information-based LEG instruments reflect what was discussed under civil-based instruments,<sup>997</sup> namely public participation and access to information. Constituents within the municipal area will not be able to access information if the municipality does not disseminate information.<sup>998</sup> Information dissemination occurs by way of environmental reporting where municipalities are required to report on certain aspects of their duties related to the environment through legislation, including the protection

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<sup>991</sup> Section 43 of the NEMBA. See also s 76(2)(b) of the NEMBA regarding monitoring, control and eradication plans for invasive species.

<sup>992</sup> Section 15(2) of the NEMAQA.

<sup>993</sup> Section 34 of the NEMICMA.

<sup>994</sup> See para 2.4 above.

<sup>995</sup> See para 3.2.3.1 above.

<sup>996</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 94-95.

<sup>997</sup> See para 4.4.3 above.

<sup>998</sup> See para 4.4.3.4 above.

of microclimate regulation services as a component thereof. Environmental reporting pertains to reporting on aspects such as the implementation of a municipality's IDP, SDFs, environmental management plans, performance management, budgeting processes, measures taken to improve environmental performance, etc.<sup>999</sup> Municipalities may also voluntarily disseminate information, without being required to do so by law. Instruments such as ecological footprint instruments, SOERs, and environmental outlook reports are effective ways in which municipalities may disseminate information about the current state of the environment and other environmental issues.<sup>1000</sup> SOERs and outlook reports set out environmental indicators which municipalities are obliged to meet and improve upon for their conservation and environmental protection efforts.<sup>1001</sup> These instruments also inform policies and are ideal for bringing environmental management to greater attention.<sup>1002</sup> Key challenges pertaining to information-based LEG instruments were discussed elsewhere in this study.<sup>1003</sup>

In addition to the above mentioned, municipalities must fulfil their duties in terms of environmental education.<sup>1004</sup> Environmental education is necessary to help civil society to be informed so that they may meaningfully participate in discussions pertaining to decisions regarding the environment and the impact of development or action on the environment and ecosystem services.<sup>1005</sup> This results in more participative and transparent processes at the local sphere of government. It also enables the community to fulfil their compliance watchdog and external monitor of municipalities-roles to ensure that municipalities perform their functions and duties in respect of the protection of microclimate regulation services.<sup>1006</sup>

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<sup>999</sup> See Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 149-150.

<sup>1000</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 150.

<sup>1001</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 150.

<sup>1002</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 150.

<sup>1003</sup> See para 4.4.3.4 above.

<sup>1004</sup> Section 2(4)(h) of the NEMA. See also para 3.4 above.

<sup>1005</sup> Nel, Du Plessis and Du Plessis 'Instrumentation for Local Environmental Governance" 152.

<sup>1006</sup> Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 153.

Cooperation-based LEG instruments are instruments that depend on more than one party's cooperation to be successful. An ardent example of such instruments is PPPs, which allow private parties to partake in the performance of a municipal function using municipal property, or both, at the cost of assuming risk, and for compensation either through a consideration to be paid by the municipality, the costs charged for the rendering of the service, or a combination of these methods.<sup>1007</sup> PPPs enable municipalities to improve upon their service delivery, and other functions related to the environment, including microclimate regulation services, and improve their capacity to deal with environmental issues identified in chapters one and two of this study.<sup>1008</sup> The benefits of using PPPs for urban municipalities include improved service delivery capacity, contribution of expert knowledge and resources, opportunity to receive training to better the skill acumen of the municipality, generation of revenue, and shared risk, amongst others.<sup>1009</sup> However, concluding a PPP agreement is not without its challenges. Due to general lack in trust between government and the private sector, PPPs are sparsely supported and utilised as an instrument to effectuate the duties of governments; an issue which seeps through to local government level.<sup>1010</sup> This might lead to an apprehensiveness regarding PPPs and the use of this instrument in relation to state provided infrastructure.<sup>1011</sup> Capacity constraints are also prevalent, due to time and resource insufficiency in urban municipalities as well as lack of knowledge and skill to manage PPPs.<sup>1012</sup>

#### **4.5 Concluding Remarks**

This chapter aimed to determine and critically discuss specific municipal governance instrumentation available in South African law for the protection of microclimate

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<sup>1007</sup> See para 3.2.4 above regarding PPPs; Nel, Du Plessis and Du Plessis "Instrumentation for Local Environmental Governance" 154.

<sup>1008</sup> See para 1.1 and 2.1 above.

<sup>1009</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 53-56.

<sup>1010</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 57.

<sup>1011</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 58.

<sup>1012</sup> Van der Berg *Legal Perspectives on the Function of Public-private Partnerships in Local Disaster Management in South Africa* 58-59.

regulation services. A literature study concerning the primary and secondary legal sources was done. This was to determine which instruments from the framework of instruments available in chapter three was firstly mandated to local governments, and secondly, appropriate for use by urban municipalities in the implementation of their functions and duties regarding environmental protection, with specific reference to the protection of microclimate regulation as an urban ecosystem service.

The local sphere of government's authority in terms of the environment is highly contested in many instances, due in part to the differentiation between the legislative and executive competencies as provided for in the schedules to the Constitution.<sup>1013</sup> As seen in the above discussion, it is a fruitless argument as there is sufficient provision elsewhere in the Constitution and in other legislation to conclude that municipalities do have obligations pertaining to the environment and the protection thereof.<sup>1014</sup> This also speaks to the protection of the components within the environment, which include urban ecosystems and the ecosystem services that they offer, which in the context of this study is focused on microclimate regulation services.

This chapter was outlined and constructed using the suggested NDD-typology because of its logical, structured, and comprehensive nature, ease of use and clarity. Despite being apportioned into specific function instruments, there are a range of overlaps present in the applicable municipal instrumentation framework laid out above.<sup>1015</sup> Some of the instruments like the IDP, SDF and LUS by their very nature are closely interlinked. However, other instruments such as by-laws, management plans, agreement-based, as well as information-based instruments are in some instances multifunctional making them fit into more than one of the categories within the typology. Nevertheless, there is also systemic fragmentation present in environmental governance resulting from shared and scattered duties and functions of different organs of state imposed by the range of different statutes, including sector-specific statutes. However, the NDD-typology is arguably more user-friendly than other

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<sup>1013</sup> See para 4.2 above.

<sup>1014</sup> See para 3.1 and 4.2 above.

<sup>1015</sup> See specifically paras 4.4.3 and 4.4 where some of the instruments are included under the fourth category created in the NDD-typology, despite forming part of the other categories as well.

typologies such as the typology consisting of substantive, procedural and structural instruments; the typology that considers instruments in terms of their spatial/geographical, political, or own performance nature suggested by Erdmenger; or the Plan-Do-Check-Act and Reporting typology.

Based on the above discussion, there are several instruments which may be used by urban municipalities to realise the protection of microclimate regulation services. Some of these instruments, such as the IDP, SDF and LUS are legally prescribed and as such municipalities are obliged to implement and enforce them. In contrast, other instruments, namely by-laws, EMCAs, management plans, directives, and compliance notices may be used by urban municipalities and in some cases be adapted to suit the needs of the municipality to enable them to realise the protection of microclimate regulation services. These instruments all enable microclimate regulation services in some shape or form.<sup>1016</sup> Many instruments like the IDP, SDF, LUS, by-laws, management plans, and incentive-based instruments arguably allow for microclimate regulation to be included in its ambit or to be incorporated as a point of discussion or importance therein due to its relation as a component of the environment. Microclimate regulation, though not provided for explicitly finds application in many of these instruments because of its nature as incidental to the environmental mandate of local government.<sup>1017</sup>

Although the range of instruments generally enable microclimate protection services, they are not without their challenges. The range of challenges includes capacity challenges, lack of expertise in the municipality preventing it from proper implementation of the instruments for microclimate regulation service protection, a lack of proper coordination and implementation as well as a lack of information and awareness on what microclimate regulation constitutes and why it is necessary to protect these services, especially in the South African context.<sup>1018</sup> These challenges all have the ability to hinder the protection of microclimate regulation services in cities. These challenges should ideally be considered before an urban municipality adopts

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<sup>1016</sup> See para 3 and 4 above.

<sup>1017</sup> See para 4.2 above.

<sup>1018</sup> See para 2.5 above in respect of the South African context.

any of these instruments for purposes of realising the protection of microclimate regulation. Municipalities are also expected to use a range of different instruments as these instruments are all formulated differently and address different ways of protecting microclimate regulation in urban ecosystems and the use of one instrument in isolation will not be sufficient to enable the required protection of microclimate regulation services. These instruments can also, if implemented incorrectly or if not properly integrated, lead to further fragmentation in respect of environmental mandates and functions

## Chapter 5 Conclusion

### *5.1 Brief Background to the Study, Context and Methodology*

The study set out to determine the available options in law for the protection of "microclimate regulation" as an urban ecosystem service in South Africa.<sup>1019</sup> In the theoretical basis of the study, the notions of urban ecosystem service and ecosystem services were explored. In addition, the interlinkages between nature and urban ecosystems became apparent, highlighting the extent to which each notion depends on the other.<sup>1020</sup> The theoretical chapter explored the meaning of these notions in the scientific domain of urban ecology and considered literature in the fields of biology and ecology to inform the perspectives set out in chapter two.<sup>1021</sup> Despite moderate uncertainty in both the discourse on what an urban ecosystem entails and the definition of ecosystem services, scholars have developed enough theory to add substance to these notions on which future scholars can build.<sup>1022</sup> Regardless of the critique levelled against the valuation of ecosystem services, the discourse on ecosystem services has developed into a broad and comprehensive topic and has gained traction across the world with many scholars analysing the importance of ecosystem services in discussions on environmental welfare, protection and sustainability.<sup>1023</sup> The MEA considered ecosystems in a broad sense and divided them into four categories based on their functions.<sup>1024</sup> This study follows the MEA classification, which has been adopted by many scholars. Chapter two briefly considered the different categories as a basis for identifying where microclimate regulation would be best suited. The chapter went on to define and contextualise microclimate regulation as an urban ecosystem service.<sup>1025</sup> Lastly, in an attempt to bring the discussion closer to home and within the purview of South African law, the chapter contextualised the situation in the country by referring to some key

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<sup>1019</sup> See para 1.2 above.

<sup>1020</sup> See para 2.4 above.

<sup>1021</sup> See para 2.2 above.

<sup>1022</sup> See para 2.3.2 above.

<sup>1023</sup> See para 2.3.2 above.

<sup>1024</sup> See para 2.3.3 above.

<sup>1025</sup> See para 2.4 above.

aspects and environmental challenges faced.<sup>1026</sup> In addressing the aims of chapter two, a literature review of sources from other disciplines, such as environmental sciences, ecology, urban ecology and biology was conducted. The use of these sources arose out of the fact that urban ecology and urban ecosystems are common concepts in the scholarly fields of biology and ecology.

The process of identifying and critically evaluating existing instruments in the South African legal framework and whether they enable or hinder the protection of microclimate regulation as an ecosystem service was located in a literature study.<sup>1027</sup> Chapter three importantly emphasised that the environmental right receives constitutional acknowledgement as part of the substantive fundamental rights in the Bill of Rights.<sup>1028</sup> As such, the instruments with a bearing on the environment and environmental concerns, discussed in chapter three are embedded in a system of law that is subject to an array of principles and constitutional values.<sup>1029</sup> The array of instruments discussed in chapter three includes a range of environmental governance instrumentation, legal compliance and enforcement measures, and also instrumentation that can be innovatively used by society.

The collection of specific municipal governance instrumentation discussed in chapter four was mostly derived from the general discussion as to the available instrumentation in South African law, as set out in chapter three.<sup>1030</sup> The typology used in chapter four was suitable for organising the variety of instruments with municipal application into categories based on the function the instruments serve.<sup>1031</sup> However, there are significant overlaps in the discussion of some instruments which indicate that though convenient and easy to understand, there might still be a *lacuna* in which unnecessary confusion may persevere due to such repetition and overlapping.<sup>1032</sup> These overlaps are also indicative of the fragmentation in spheres

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<sup>1026</sup> See para 2.5 above.

<sup>1027</sup> See para 3 above.

<sup>1028</sup> See para 3.1 above.

<sup>1029</sup> See para 3.1 above.

<sup>1030</sup> See para 3.2-3.4 above.

<sup>1031</sup> See para 4.4 above.

<sup>1032</sup> See para 4.5 above.

of government, organs of state and even line function departments. Besides the typological categorisation, attention was also placed on the fact that the use of some instruments is legally mandated.<sup>1033</sup> In contrast, others are discretionary and voluntary, and these must be used together to address the environmental governance duties that municipalities are expected to exercise.

The discussion throughout this study, and especially pertaining to chapters three and four, actively illustrated that the South African law provides a broad and elaborate range of options that may be used in the quest to enable the protection of microclimate regulation.

## ***5.2 Research Question and Study Focus***

The research question of this study questioned the available options in South African law for the protection of "microclimate regulation" as an urban ecosystem service.

## ***5.3 Main Findings***

The main findings of this study are:

- The notions of the urban ecosystem and ecosystem services are not yet universally defined, but the scholarship regarding these concepts has undergone a process of development, bringing about a range of individualised ideas and understandings of what these concepts mean. As a result of the work of a variety of scholars, certain characteristics can be discerned and used as a point of departure when discussing these concepts.<sup>1034</sup> As this study observed, these concepts do not include ecosystem disservices.<sup>1035</sup>
- Ecosystem services are of great value to human beings and offer different categories of services.<sup>1036</sup> People have subsequently attached value,

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<sup>1033</sup> See para 4.3 above.

<sup>1034</sup> See para 2.3. above.

<sup>1035</sup> See para 2.3.2 above.

<sup>1036</sup> See para 2.3.2 above.

monetary and otherwise, to ecosystem services, and this perceived value determines whether these services are worthy of protection or not.

- Value is attributed to ecosystem services based on the benefit they hold for human beings and rarely due to the intrinsic value of the environment and its ecosystems.<sup>1037</sup>
- Microclimate regulation as a notion does not feature prominently in literature on urban areas, and in instances where it does, it is usually in the context of street trees or private gardens.<sup>1038</sup>
- Microclimate regulation services provide important benefits in cities and contribute significantly to climate regulation in cities that suffer from extensive heat islands and pollution.<sup>1039</sup> The range of ecosystem components that provide these microclimate regulation services in South Africa are grossly under-protected and, in many instances, they are threatened and at risk of being damaged irreparably.<sup>1040</sup>
- The existing legal framework is extensive in terms of available instruments that have a bearing on the environment or aspects of the environment such as microclimate regulation. These aspects of the environment, therefore, are protected sufficiently by the legal framework.<sup>1041</sup> Unfortunately, many of these legal instruments are underutilised even though they hold great potential for environmental and microclimate regulation protection.<sup>1042</sup>
- Many of the identified instruments have specific bearing on the mandates of urban municipalities or can be altered by such municipalities to protect microclimate regulation ecosystems services in the urban municipal areas.<sup>1043</sup> Specific examples of such instruments are the IDPs, SDFs and LUSs that

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<sup>1037</sup> See para 2.3.2 above.

<sup>1038</sup> See para 2.6 above.

<sup>1039</sup> See para 2.4 above.

<sup>1040</sup> See para 2.4 and 2.5 above.

<sup>1041</sup> See para 3.2 and 3.3 above.

<sup>1042</sup> See para 3 above.

<sup>1043</sup> See paras 3.2, 3.3, 4.3 and 4.4 above.

municipalities are required to draft and in which they may incorporate environmental objectives, targets and considerations. Further examples include management plans and incentive-based instruments in which municipalities may adopt at their discretion.<sup>1044</sup> This discretion extends to the protection of microclimate regulation services.

- All the instruments enable the protection of microclimate regulation in some way, meaning that municipalities have an extensive range of instruments to choose from.<sup>1045</sup>
- Each instrument has concomitant challenges that need to be carefully considered by an urban municipality before it is included in that municipality's plan to protect its microclimate regulation services.<sup>1046</sup>
- Municipal planning instruments and environmental considerations are interlinked in such a manner that they result in the need for proper integration and coordination between environmental concerns such as the protection of microclimate regulation services and planning instruments by incorporating environmental concerns into planning and development decisions and instruments.<sup>1047</sup> This interlinkage plays an important role in elevating the environment, and in this case microclimate regulation services, to a topic of consideration in planning and development decisions.

It is subsequently concluded that there are sufficient options in law that enable the protection of microclimate regulation as an urban ecosystem service in South Africa. Regardless of stringent requirements as to their content, mandatory instruments such as IDPs, SDFs and LUSs are effective municipal instruments in which urban municipalities can also innovatively incorporate a range of environmental considerations, including the protection of microclimate regulation services.<sup>1048</sup>

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<sup>1044</sup> See para 4.4.3.2 above.

<sup>1045</sup> See paras 3.5 and 4 above.

<sup>1046</sup> See para 4.4 above.

<sup>1047</sup> See para 4.2 and 4.3 above.

<sup>1048</sup> See para 4.3.1 above.

These mandatory instruments may be used in conjunction with other effective instruments such as incentive- and agreement-based instruments to achieve and realise the protection of microclimate regulation services.<sup>1049</sup> In addition to this, by-laws are also beneficial instruments as municipalities have the mandate to draft by-laws for any matter within its competence and they may be innovatively used for the protection of microclimate regulation services.<sup>1050</sup> The relative autonomy of local government in South Africa also makes it possible for municipalities to select and adopt innovative alternative instruments. Smart technologies and innovation around the generation and use of data being one potential instrument.

#### **5.4 Recommendations**

Based on the findings identified above, this study makes the following recommendations:

- Ecosystem services should more clearly be incorporated into policy and legislation, and the legislative authority should characterise these services based on the South African context and inclusive of the good and bad ecosystem services.<sup>1051</sup>
- Researchers should investigate the effects of microclimate regulation as urban ecosystem services by considering the effects of urban parks and other green infrastructure in urban areas.
- All spheres of government should improve their efforts in terms of environmental protection to conserve and protect the resources that provide ecosystem services.
- Municipalities should be provided with the necessary financial and human resource capacities and with assistance in drafting by-laws specifically aimed

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<sup>1049</sup> See para 4.4.3.2 and 4.4.3.3 above.

<sup>1050</sup> See para 4.3.2 above.

<sup>1051</sup> See para 2.3.2 above.

at the protection of ecosystem services, and in the current context at the protection of microclimate regulation services.

- Municipalities should also establish enforcement mechanisms such as policing and municipal courts for the enforcement and adjudication of such by-laws and for matters related thereto.
- Urban municipalities should be innovative in their approach when it comes to adopting instruments such as incentive- and agreement-based instruments. At the same time, they should be cautious and conscious of the limits on their capacity and the kinds of constraints they experience. They should ensure that the instruments they adopt are best suited and altered to their municipal context taking into consideration their financial and implementation capacities.
- Technology and smart innovation, for example, offer significant scope for the development of novel instruments and municipalities are encouraged to explore these and other options in line with their relative constitutional autonomy to regulate local affairs.

### ***5.5 Limitations of this Study***

There are limitations to this study. Literature is replete with issues on urban ecosystems and ecosystem services and how they are affected by human activities. Available studies highlight the importance of especially provisioning and cultural services, but do not adequately focus on supporting and regulating services.

As this was a study based in literature, only the law and policy as it is, have been considered. The law seems to make adequate provision for instruments that may be utilised by municipalities and other government departments for the protection of microclimate regulation services. Interviews or discussions with key municipal personnel might have illuminated other challenges pertaining to the available instruments that might not be clear from the literature. However, such interviews were not conducted.

The scope of this study pertains to the legal protection of microclimate regulation as an urban ecosystem service, particularly. This dissertation is also predominantly focused on cities and the environmental challenges of urban heat islands and extreme climate variation that they experience.<sup>1052</sup> As a result, rural municipalities have not been discussed or evaluated in this study.

Climate change and its concomitant effects are experienced globally. Heat islands and rising city temperatures, as well as environmental degradation affect cities worldwide. This study is limited to the South African context and considers environmental, local government and planning law in terms of the specific mandates afforded to urban municipalities.

### ***5.6 Pointers for Future Research in this Field***

There are some interesting notions and issues that came to the forefront through the course of this study. These are briefly listed as research questions below. These questions may provide the basis for future research in the present study field.

- To what extent would so-called "biophilic cities" that provide daily contact with nature be attainable in the South African city context? How would these "biophilic cities" contribute towards microclimate regulation in South African cities?
- To what extent would urban green buildings contribute to microclimate regulation in cities?
- Would the options in law be the same for other urban ecosystem services in South African cities? To what extent would the options in law differ for other ecosystem services such as cultural and supporting services?

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<sup>1052</sup> See para 2.3 and 2.4 above.

- Would the options in law be the same for ecosystem services in South African rural areas? To what extent would the options in law differ for rural areas in the protection of their microclimate regulation services?

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