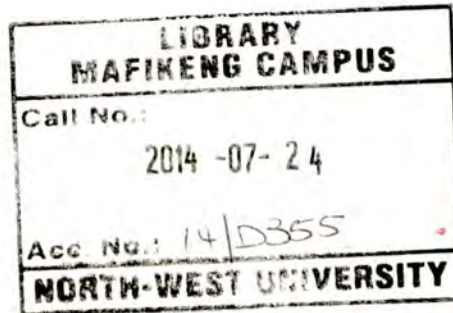


**LOCAL DEVELOPMENT, ITS MITIGATION AND ADAPTATION STRATEGIES
ON CLIMATE CHANGE: A case study of Madibogo village**



North-West University
Mafikeng Campus Library

A mini dissertation submitted in partial fulfilment
of the requirements for the degree of

**MASTERS IN INDIGENOUS KNOWLEDGE SYSTEMS:
FACULTY OF HUMAN AND SOCIAL SCIENCE**

of

NORTH WEST UNIVERSITY

by

PULENG ANERIA MAAKE

16180828

Supervisor: Dr. Otsile Ntsoane

Abstract

"In Africa, when an old person dies it is like when a library burns down." Hampâté Ba, Malian philosopher.

"The things that grandmothers can see while sitting on the ground, younger people cannot see even if they climb to the top of a tree." Senegalese proverb.

Linking climate change to sustainable development has caused a shift in the focus of the climate change discourse. The main discourse concerns the environment, poverty and sustainable development. This development discourse will help future researchers to negotiate the often contested and sometimes politicized agenda around the debate on the value of climate change to local development policies.

The time has come to take into consideration IKS and the role it plays in community life, extremely seriously. IKS needs to be recognised and integrated into development strategies by all levels of government. At the same time, it is necessary to understand and explore the potential contribution of IKS to local development. Recognition and integration of IKS into development strategies or policies requires research. However, research into IKS, should ideally be carried out with the participation of the local communities.

Research has shown that women are best experienced in IKS and have developed resilient systems to mitigate and resolve local problems. Through life orientation they hold strategic IKS and turn out to be more active in the local development agenda.

The findings were that people were highly dependent on government grants since there were no job opportunities due to a decline in farming activities and excessive weather conditions. These factors were in turn causing unusual diseases, migration of people from rural to urban areas in search of job opportunities and developments. Drought and veldt fires also led to a decline in grazing pastures and numbers of livestock. Extinction of indigenous plants, premature deaths, water scarcity and dried-up fountains that used to supply the community members with water are attributes of climate change leading to lack of development.

It was revealed that developments take time to reach rural people because their voices were not heard by those who are in power. Lack of community consultation on developments and prioritization of community needs were matters of concern to the respondents.

Declaration

I Puleng Aneria Maake declare that this dissertation is my own work and where other sources are used I have duly acknowledged them. It is submitted for the degree of Masters of IKS (Indigenous Knowledge Systems) in the North-West University, Mafikeng campus. It has not been submitted before for any other degree or examination in any other University. I also declare that this is my original work produced and submitted in accordance with all rules of professional academics standards and ethics.



Acknowledgement

I would like to extend my sincere and special gratitude to the following people for their contribution:

My supervisor, Dr. Otsile Ntsoane for being patient in giving advice and guiding my work,

My husband Thabo, Karabo (son) and Kgaogelo (daughter) for their support and investing family quality time into my study, my mother Gotsilekhumo Merriam Makhoana, for accompanying me in the cold winter weather when I was collecting data at Madibogo.

A special thank you to the elderly people and farmers from Madibogo, who shed light on their experiences on Indigenous Knowledge Systems.

The tribal office of Madibogo, particularly Kgosi Phoi for granting permission to collect data in the area, not forgetting the Ratlou Local Municipality for sharing their IDP document,

Prof. V. Nkondo, Prof H.O Kaya, Dr. Mubangizi and Mr. Motheo Koitsiwe for sharing knowledge during the postgraduate workshop on IKS Philosophical and conceptual frameworks held in Durban, and finally

Everyone who contributed and made this research project a success. I thank you.

Table of Contents

Title details.....	
Abstract.....	
Declaration	
Acknowledgment.....	
Table of contents.....	

Chapter 1

1.0Introduction.....	1
1.1 Background.....	3
1.2 Scope and area of the study.....	12
1.3 Statement of the problem.....	12
1.4 Research questions.....	13
1.5Rationale and Justification of the Study.....	13
1.6 General Aim of the Study.....	15
1.7Specific Objectives of the study.....	15
1.8Definition of terms.....	17
1.9Conclusion.....	19
1.10 Acronyms.....	20

Chapter 2

2.0 Introduction.....	22
2.1 What is Climate Change.....	22
2.2 The effects of Climate Change in Developing Regions.....	25
2.3 Different Theories & Perspectives on Global Climate Change.....	27
2.4 How Global Climate Change Policies address the issue of IKS.....	27
2.5 Why was there a sudden interest in IKS over the last three decades.....	28
2.5.1 Failure by science to provide answers to the global environment crisis.....	28
2.5.2 A struggle for intellectual freedom.....	29
2.5.3 Indigenous as an Economic Venture.....	29
2.6 What has been researched on IKS?.....	30
2.7 Challenges and opportunities for incorporating IKS into Climate Change Policies.....	31
2.8 Global Recognition.....	33
2.9 Climate Change and Sustainable Development.....	34

2.10 Euro-centric & Afro-centric Perspectives on Climate Change.....	35
2.11 Conclusion.....	36
 Chapter 3	
3.0 Introduction.....	37
3.1 Research Methodology.....	37
3.2 The Case Study Method.....	37
3.3 Triangulation Method.....	39
3.4 Research Ethics.....	41
3.5 Reflections on the research Methodological process.....	42
3.6 Conclusion.....	43
 Chapter 4	
4.0 Introduction.....	44
4.1 Theoretical Frameworks for quantitative Data Analysis.....	44
4.2 Theoretical Frameworks for Qualitative Data Analysis.....	44
4.3 Analysis of the demographic & Socio-Economic characteristics.....	46
4.4 Perceptions of respondents to climate change.....	53
4.5 Conclusion.....	65
 Chapter 5	
6.0 Introduction.....	67
6.1 Recommendations for the integration of local knowledge systems into Local Development Climate Change Policy Strategies.....	67
6.2 Conclusion	69
 Annexure A: Research Questionnaire.....	 70
 Bibliography	 78

Chapter 1

An orientation to the study

1. 0 Introduction

This chapter provides an orienting framework to the entire research project. It introduces the term “local development” and takes the reader through a tour of the South African governance structure with the intention to locate local government. It also includes the background to the problem; climate change as a threat to global sustainable livelihood and development, and defined the problem. Included in the background are the various efforts made internationally to address the problem, as well as IKS and its role in climate change adaptation and mitigation in developing countries and Africa in particular.

The chapter moves on to outline the scope and area of the study, statement of the problem, research questions, the rationale and justification of the study, the main aim and specific objectives of this research.

Towards the end, the chapter introduces the reader to the general structure and organization of the research report. A brief outline of the focus of each of the six chapters that makes up the entire research report is therefore given. At the end of the chapter, a list of all acronyms used in the research report is provided. In essence the chapter helps to give the reader a good sense of the overall research project. It is in fact an orienting chapter.

Introduction of the term “Local Development”

The term “local development” has become an imperative driving towards achieving the Millennium Development Goals (Goal No. 1, 7 and 8) in particular. Nevertheless, in order to understand the compound term “local development”, it is necessary to unpack it and firstly understand the meaning of the term “development”.

Development refers to the refinement, improvement, and expansions of existing skills through the refinement of cells already present (Schuster, 1992, in Hooper 2013 online <http://www.education.com/reference/article/definition-development-children/>). He further explained that at its most fundamental level, development involves change. This change, according to him must be cumulative and systematic; random change is not considered to be

developmental in nature. Whereas the concept of growth refers to the addition of new components or skills through the appearance of new cells, more specifically, three basic criteria must be met before change can be considered to be development:

1. The change must be orderly—not random fluctuations of behaviour.
2. The change must result in a consistent modification in behaviour.
3. The change must contribute to a higher level of functioning in the individual.

In light of the above, the definition of development can be summarized as a state in which things are improving or as an act of improving by expanding or enlarging or refining. Development can on the other hand be defined as, the act of developing or disclosing that which is unknown; a gradual unfolding process by which anything is developed, as a plan or method, or an image upon a photographic plate; gradual advancement or growth through a series of progressive changes; also, the result of developing, or a developed state.

Moreover, development can also be defined as an improvement in human welfare, quality of life, social wellbeing, thus satisfying the population's needs and wants. According to this definition, development in this regard is measured using a range of socio-economic indicators. Furthermore, within the sustainable development context development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs and can be measured using indicators of environmental quality.

In the light of the above definitions, the compound term “local development”, is therefore defined as a state in which the local area is improved, expanded, enlarged or refined to meet the needs of the present without compromising the ability of future generations to meet their needs and can be measured using indicators of environmental quality.

The South African Governance structure

Having defined local development within the South African context, it is now imperative to take the reader through the South African governance to be able to locate local government as the third sphere of government. Thus, South Africa is a constitutional democracy, run on a system of co-operative governance and has a three-tier system of government and an independent judiciary. All the three levels of government, national, provincial and local have

legislative and executive authority in their own spheres, and are defined in the Constitution as "distinctive, interdependent and interrelated".

In order for the above three spheres to run efficiently and effectively, the National Treasury allocates them annual budgets to carry out their constitutional mandates, and municipalities are mandated to develop their communities. As such, municipalities have a key role to play in South Africa's social and economic development. With the budget allocation they get from the National Treasury, municipalities are expected to develop communities by providing basic services and improving the lives of the community as well as to maintain the highest standards of accountability.

However, in delivering their constitutional mandate, municipalities are faced with numerous developmental challenges emanating from climate change, which in turn impact negatively on the sustainability of local communities. In view of this context, the central focus of this study will be around climate change as a challenge to local development. The researcher will also explore possibilities and challenges of integrating indigenous knowledge systems into climate change policies for sustainable development, within Ratlou Local Municipality.

1.1 Background to the problem

Climate change is a threat to global sustainable livelihoods, affecting both the developed and developing countries. However, studies have shown that the biggest contributions to global climate change come from the wealthy and developed countries, particularly the United States because it is the largest producer of greenhouse gases due to industrialization.

Climate change is therefore regarded as the greatest environmental challenge facing the world this century. Although often referred to as 'global warming', global climate change is more about serious disruptions of the entire world's weather and climate patterns. This impacts on developing country's rainfall patterns, extreme weather events and sea level rise, both in terms of the impacts of climate change and the capacity to respond to it. Thus, the developing world faces greater challenges than the developed world, both in terms of impact of climate change and the capacity to respond to it. On the other hand, by far the biggest contributions to global climate change come from the wealthy developed countries of the Northern Hemisphere (National Climate Change Response Strategy for South Africa, 2004: iii).

Subsequent to observations on climate change, numerous international and local attempts have continuously been made to address it and reverse global warming. First there was the United Nations Framework Convention on Climate Change (UNFCCC), which was tabled in 1992 at the United Nations Conference on Environment and Development. The objective of the UNFCCC was to achieve stabilization of the concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

However, it was soon recognized that the commitments set out by the UNFCCC were inadequate for achieving its ultimate objective and this led to the adoption of the Kyoto Protocol in July 2002. The Kyoto Protocol established legally binding obligations for developed countries to reduce their greenhouse gas emissions. The Kyoto Protocol solely centred on controlling and reducing CO₂ emissions.

Commitments of the Kyoto Protocol included firstly Annex I countries, (of which South Africa is not part as it falls under Annexure II,) ratified the Protocol committing them to reducing their emission level of greenhouse gases to targets that are mainly set below their 1990 levels. This was to be done by allocating reduced annual allowances to the major operators within their borders. The operators were only allowed to exceed their allocations if they bought emission allowances, or offset their excesses through a mechanism that was agreed by all the parties to UNFCCC. Although, the developing countries were not required to reduce emission levels, South Africa's economy would be adversely affected by efforts to reduce emissions by Annex I Parties. This is because the economy of this country is highly dependent on income generated from the production, processing, and export of fossil fuels to Annexure I countries. For instance, South Africa is one of the producers of coal, which is exported to Annexure I countries. Thus, if those countries are restricted and have to reduce their emissions, they will no longer buy from our country, therefore; the coal mines will have to close down thereby impacting negatively on the Gross Domestic Product of the country.

Most industrialized countries and some central European economies in transition agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008-2012, defined as the first emissions budget period. Thus, the United States was required to reduce its total emissions at an average of 7% below 1990 levels; however Congress did not ratify the treaty after President Bill Clinton signed it. The

Bush administration explicitly rejected the protocol since 2001 and participated only as observers and declined to participate actively in the negotiations.

Following a number of conferences held between 1995 and 2010, the negotiations on extending the Kyoto Protocol had unresolved issues as did the negotiations on a framework for long-term cooperative action. Global climate change is still a problem that warrants extensive research. One of the limitations of previous negotiations which exacerbate the problem is that many Annex 1 industrialized countries were reluctant to fulfill commitments under the Kyoto Protocol. Moreover, a large part of the diplomatic work that laid the foundation for a post-Kyoto agreement was undertaken up at the Conferences of the Parties (COP16/MOP 6) held at Cancun, Mexico, 2010. South Africa, as one of the Annexure II countries was not subject to emission reduction commitments in the first Kyoto commitment period. However, the large potential for growth in developing country emissions made negotiations on this issue tense e.g. the effect on South African Coal mines. In the final agreement, the Clean Development Mechanism was designed to limit emissions in developing countries, but in such a way that developing countries do not bear the costs for limiting emissions. The general assumption was that developing countries would face quantitative commitments in later commitment periods, and at the same time, developed countries would meet their first round commitments.

In 2006, certain strides were made at COP12, including the areas of support for developing countries and clean development mechanism. The parties adopted a five year plan of work to support climate change adaptation by developing countries, and agreed on the procedures and modalities for the Adaptation Fund. They also agreed to improve the projects for the clean development mechanism. In support of efforts to fight climate change and reaffirm the commitment of the Rio de Janeiro summit called “Agenda 21”, the World Summit on Sustainable Development (WSSD) took place in South Africa, as well as the formulation of the Johannesburg Plan of Implementation (JPOI) in 2002.

Agenda 21 was regarded as the potential and essential link of global problems to local solutions through a principle: “think globally, act locally” in order to fulfill sustainable development. It also recognized that the municipalities as the sphere of governance that is closest to the people or communities, can effect tangible changes in attitudes and activities at a community level. It also promoted integration of planning process with economic, social and environmental sustainability in order to achieve the goals of sustainable development that

the present generation owes to the future generation. Environmental education, as a principle of Local Agenda 21 states that the local government, which is the closest to people, should play a vital role in educating, mobilizing and responding to the public to promote sustainable development. LA 21 also encourages the consultation and participation of communities in order for them to make a reality out of the ideology of “think locally, act globally” and effect changes in behaviour and attitudes towards environmental sustainability (Southern District Municipality, IDP Review Draft 2008-2009: 239-240)

In the process of transformation in South Africa, environmental management also received guidance by way of different legislations that were incorporated into planning and development by all spheres of government in order to achieve sustainable development. These include but are not limited to, Section 24 of the Constitution of the Republic of South Africa Act 108 of 1996 as well as the National Environment Management Act 107 of 1998. Section 24 has made a provision that everyone has the right to an environment that is not harmful to their health and well-being and, to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: prevent pollution and ecological degradation, promote conservation, and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development. According to the latter Act, sustainable development requires integration of social, economic and environmental factors into planning, implementation and evaluation of decision to ensure that development benefits not only the present but the future generation. NEMA Act also recognizes that the previously disadvantaged need respect protection and recognition of their rights to a sustainable economic, social and ecological environment for the fulfillment of their basic needs by the state. (Southern District Municipality, IDP Review Draft 2008-2009: 239-240)

The Rio de Janeiro summit also confirmed commitment to achieving the Millennium Goals and the major United Nations conferences and international agreements since 1992 (North West Provincial Growth and Development Strategy, 2004-2014). Climate change impacts negatively on the eight Millennium Development Goals (MDGs) which have become a major framework for global development policy, practice, and donor assistance. As such, Climate Change cannot be divorced from the Millennium Goals. Over the past decade, progress towards meeting the goals has been made, but has been uneven. Considerable work remained if the MDGs were to be achieved by 2015. At the same time, the current and anticipated effects of climate change threatened further progress on each of the MDGs. These effects

were mostly felt on the MDG 1: Eradicate extreme poverty and hunger. While poverty rates have fallen, the number of people living in poverty has risen. Climate change is making the lives of people who live in poverty more challenging, eroding sources of consistent income, and straining coping strategies used to survive hardship. The growing lack of predictability in weather, and the increased number of climate shocks, is disrupting individual and household planning and budgeting, closing off avenues to climb out of poverty (Mia McDonald, 2010:7)

Africa is one of the most vulnerable regions in the world to climate change. This vulnerability and the limitations of poor countries to adapt to climate change challenges were highlighted in Climate Change 2001, the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). In North Africa and the Sahel, increasing drought, water scarcity and land overuse will degrade soils and could lead to a loss of 75% of arable, rain-fed land. The Nile Delta could be at risk from sea-level rises in this century with 5 million people affected by 2050. Already today climate change is having a major impact on the conflict in and around Darfur. In the Horn of Africa reduced rainfall and increasing temperatures will have a significant negative impact on a region highly vulnerable to conflict. In Southern Africa, droughts are contributing to poor harvests, leading to food insecurity in several areas with millions of people expected to face food shortages. Migration in this region, but also migration from other regions through Northern Africa to reach Europe (transit migration) is likely to intensify. In Africa, and elsewhere, climate change is expected to have a negative effect on health, in particular due to the spread of vector borne diseases further aggravating tensions (Climate Change and International Security, 2008:6)

The IPCC Third Assessment Report acknowledged that climate change was already happening, and will continue to happen, even if global greenhouse gas emissions are curtailed significantly. Thus, there is now more confidence that global climate change is a threat to sustainable development, especially in developing countries. This could undermine global poverty alleviation efforts and have severe implications for food security, clean water, energy supply, environmental health and human settlement. As such, since there were no formal commitments to the IPCC itself, researchers were encouraged to make meaningful contributions with the structure and where possible relevant local research was called in support of the work of IGBP.

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report published in early 2007 also confirmed that global climate change was already happening.

The report found that communities who lived in marginal lands and whose livelihoods were highly dependent on natural resources were among the most vulnerable to climate change. Many indigenous and traditional peoples who had been pushed to the least fertile lands as a consequence of historical, social, political and economic exclusion were among those who were at great risk. On the other hand, people living in marginal lands had long been exposed to many kinds of environmental changes and had developed strategies for coping with those phenomena. The report further acknowledged that indigenous and traditional people had valuable knowledge about adapting to climate change. However, the magnitude of future hazards may have exceeded their adaptive capacity, especially given their current conditions of marginalization. The report also made it clear that the potential impacts of climate change on the livelihoods and cultures of indigenous and traditional communities remain largely unknown

Furthermore, the goals of the IUCN report on Indigenous Peoples and Climate Change was amongst others, to improve understanding of the potential impacts of climate change on vulnerable communities and cultures and their associated ecosystems; to identify further research required to reduce the risk of climate change; and to develop appropriate adaptation and mitigation measures, particularly in areas with a high risk of socio-cultural impacts. Through this report, IUCN offered some elements that would facilitate integration of socio-cultural considerations in programmes and actions to address climate change impacts. The findings of the IUCN report after analyzing the treatment of indigenous people in climate change policy documents, was that even though these documents agree the costs of climate change are going to fall inequitably on the world's poorest and most disadvantaged communities including traditional and indigenous peoples, the communities discussed almost exclusively live in developed countries. The majority of traditional and indigenous peoples who live in the tropical developing world, get very little or no consideration. Furthermore, while all the analysed documents put their emphasis on monetary, knowledge and technology transfer from developed to developing countries, traditional and indigenous peoples' own coping and adaptive strategies are hardly recognized (Macchi, 2008:4)

Climate change was already being observed through rising temperatures, melting glaciers, shifting rainfall patterns, increased storm intensity and rising sea level. Greenhouse gas (GHG) emissions from human activities –mainly fossil fuel, deforestation and agriculture, caused climate change.

The report found that communities who lived in marginal lands and whose livelihoods were highly dependent on natural resources were among the most vulnerable to climate change. Many indigenous and traditional peoples who had been pushed to the least fertile lands as a consequence of historical, social, political and economic exclusion were among those who were at great risk. On the other hand, people living in marginal lands had long been exposed to many kinds of environmental changes and had developed strategies for coping with those phenomena. The report further acknowledged that indigenous and traditional people had valuable knowledge about adapting to climate change. However, the magnitude of future hazards may have exceeded their adaptive capacity, especially given their current conditions of marginalization. The report also made it clear that the potential impacts of climate change on the livelihoods and cultures of indigenous and traditional communities remain largely unknown

Furthermore, the goals of the IUCN report on Indigenous Peoples and Climate Change was amongst others, to improve understanding of the potential impacts of climate change on vulnerable communities and cultures and their associated ecosystems; to identify further research required to reduce the risk of climate change; and to develop appropriate adaptation and mitigation measures, particularly in areas with a high risk of socio-cultural impacts. Through this report, IUCN offered some elements that would facilitate integration of socio-cultural considerations in programmes and actions to address climate change impacts. The findings of the IUCN report after analyzing the treatment of indigenous people in climate change policy documents, was that even though these documents agree the costs of climate change are going to fall inequitably on the world's poorest and most disadvantaged communities including traditional and indigenous peoples, the communities discussed almost exclusively live in developed countries. The majority of traditional and indigenous peoples who live in the tropical developing world, get very little or no consideration. Furthermore, while all the analysed documents put their emphasis on monetary, knowledge and technology transfer from developed to developing countries, traditional and indigenous peoples' own coping and adaptive strategies are hardly recognized (Macchi, 2008:4)

Climate change was already being observed through rising temperatures, melting glaciers, shifting rainfall patterns, increased storm intensity and rising sea level. Greenhouse gas (GHG) emissions from human activities –mainly fossil fuel, deforestation and agriculture, caused climate change.

If GHG emissions are not reduced to significantly below the current level and rise for centuries to come, this results in adverse impacts on human health, natural ecosystems, and the economy. The risk of serious climate change impacts suggested that urgent action was needed to significantly reduce GHG emissions in the coming decades. There was increasing evidence that the overall benefits of strong and early action to reduce GHG emissions outweighed the costs. But we need to reduce emissions at the lowest possible cost if we are to have a realistic chance of limiting further climate change. According to the analysis of Organization for Economic Co-operation and Development (OECD) Policy Brief (2007:1), large reductions in GHG emissions were to be achieved at relatively low costs, if the right policies were put in place. This, according to the analysis included strong use of market-based instruments worldwide to develop a global price for GHG emissions. This could have only been possible if it was accompanied by better integration of climate change objectives in relevant policy areas such as energy, transport, building, agriculture or forestry, and other measures to speed technological innovation and diffusion.

In developing countries, large amounts of total GHG emissions came from deforestation and forest degradation. Moreover, studies suggested that reducing emissions from deforestation in developing countries was a cost-effective option relative to GHG mitigation in other sectors with multiple benefits. Policy options and positive incentives were needed to reduce emissions from deforestation, as well as to enhance the uptake of CO₂ by forests (Organization for Economic Co-operation and Development Policy Brief, 2007:5).

According to the South African Country Studies, for a time horizon of 50 years, using a series of general circulation model (GCM) simulations, measurable changes in climate could have been expected to have significant effects on various sectors of South African society and the economy. These potential effects of a changed climate within 50 years and possible adaptation strategies were identified for the following sectors: human health; maize production; plant biodiversity; water resources; rangelands; and animal taxa. Furthermore, urban air pollution from low-level sources, such as domestic emissions, would become a greater problem, due to the enhanced occurrence of temperature inversions resulting from climate change. These inversions serve to trap the smoke from such sources near ground level giving rise to excessive ambient concentration (National Climate Change Response Strategy for South Africa, 2004: 4)

The European Security Strategy recognized the link between global warming and competition for natural resources while the Communication “Europe in the World” highlighted the effects of globalization on external relations. The report considered how the full range of EU instruments, including Community and CFSP/ESDP action, could be used alongside mitigation and adaptation policies to address the security risks. It also considered the implications for the intensification of political dialogue with third countries. The strategy further outlined some of the forms of conflicts driven by climate change which might occur in different regions of the world such as, Conflict over resources; Economic damage and risk to coastal cities and critical infrastructure; Loss of territory and border disputes; Environmentally-induced migration; Situations of fragility and radicalization; Tension over energy supply and Pressure on international governments (Climate Change and International Security, 2008).

The Kyoto Protocol and the resulting carbon markets had a narrow focus on industrial and energy-related emissions which only benefited a few African countries with a sizeable industrial base such as Nigeria, South Africa and Egypt. As a result of this biased focus, out of more than 1,100 Clean Development Mechanism (CDM) projects registered by June 2008, only 17 are located in Africa, and of those 17, Uganda, Tanzania and Nigeria had one project each, whilst the remaining 14 were located in South Africa. In Sub-Saharan Africa, agriculture, forestry and land use (commonly referred to as AFOLU) held the most promising potential for carbon finance. The carbon market was driven by buyer’s preferences and had shown little interest in supporting genuine poverty eradication and sustainable development in Africa’s largely agro-based economies. Notably, the less industrialized African countries already store significant amounts of carbon in their soils and forests.

The November 2008 Nairobi Declaration on Climate Change adopted by the COMESA Ministers of Agriculture and Environment, advocated the inclusion of all bio-carbons in the post 2012-climate change regime . It also noted that the continent could not afford to wait any longer, and demanded that the rules for a post-Kyoto agreement be changed. As such, Civil Society in Support of African Governments COMESA, in conjunction with SADC and EAC, mandated FANRPAN to mobilize African civil society organizations under the Africa-wide Civil Society Climate Change Initiative for Policy Dialogues and facilitated dialogue around the Africa Bio-Carbon proposal.

The main objective of these dialogues was to ensure alignment between Africa's approach to tackling the current Climate Change negotiations and beyond. Africa was advocating a post 2012 protocol that was PRO-REDD and PRO-AFOLU (The Africa-wide Civil Society Climate Change Initiative for Policy Dialogue (ACCID)).

In conclusion, the developing countries often bitter colonial past and culturally corrosive effects of globalization made it necessary to encourage improved IK and IKS awareness among the population as a whole. This was meant to enable Africans to fully understand and appreciate the impact and potential impact of IKS on their daily lives. Moreover, the innovation and diffusion of technology, tools and knowledge, especially at a smaller scale, offered enormous potential for addressing problems of both rural and urban development, and poverty reduction. In rural areas, appropriate technology could contribute both to increased non-farm income generation small-scale enterprise and enhanced agricultural productivity. Technological innovations for small-scale rural enterprises might have had negative consequences for the environment such as pollution, heavy natural resource extraction and uncertain implications for rural inequality and poverty alleviation. Environmentally friendly technologies together with IK could be used for both conservation and sustainable use of the natural resources, as well as to reduce poverty. promoting applied research, the transfer and diffusion of innovations in appropriate technology; development of a more informed and balanced global debate on the potential advantages and risks presented by the advances in certain specific fields of science and technology, for example biotechnology, could bring benefits (Indigenous Knowledge Systems Policy, 2004:31-32)

According to the Organization for Economic Co-operation and Development Policy Brief of August 2007:1, large reduction in GHG emissions were needed in the coming decades and throughout the century .This could only be achieved through greater attention to accelerate the up-take of existing "green" technologies and practices, for example policies to encourage greater energy efficiency. Thus, the risk of serious climate change impacts suggested that urgent action was needed to significantly reduce GHG emissions in the coming decades. Again, there was increasing evidence that the overall benefits of strong and early action to reduce GHG emissions outweighed the costs. But emissions needed to be reduced at the lowest possible cost if we are to have a realistic chance of limiting further climate change.

1.2 Scope and area of the study

The study was conducted in the Republic of South Africa, a country which comprises nine provinces. The study took place in one of the nine provinces, the North West. The North West province comprises four district municipalities and 19 local municipalities with a population of 3, 5 million people as per the 2011 census report. The study was conducted within the jurisdiction of Ngaka Modiri Molema District Municipality, at Ratlou Local Municipality, at Madibogo village.

Map of North West Province (showing Madibogo village)



1.3 Statement of the Problem

Climate change is a threat to the sustainable livelihood of the community and its development, especially in the developing regions such as Africa which have limited capacity to cope with adverse effects namely poverty and environmental degradation. The local communities, through their indigenous knowledge systems, have developed and implemented extensive mitigation and adaptation strategies that have enabled them to reduce their vulnerability to climate variability. However, this knowledge is rarely taken into consideration in the design and implementation of modern mitigation and adaptation strategies. Local development policies have tended to neglect the contribution of IKS in sustainable livelihood and development. If IKS is to contribute effectively to adaptation and mitigation of the global challenges of climate change in this century they need to be

adequately documented to identify their limitations and strengths, interfaced with modern knowledge and technological systems and be incorporated in the search for sustainable solutions to climate change.

Moreover, although research is gradually recognizing the importance of indigenous knowledge systems in developmental studies, the value of indigenous knowledge in climate change studies has received little attention. There is also a concern that in spite of the fact that women in most rural communities in Africa and other developing countries are the basis of sustainable community livelihoods and, as a result, they have a wide knowledge of the natural environment in their local communities, their knowledge was not taken seriously in the search for sustainable solutions to climate change.

1.4 The Study is guided by the following research questions:

- What makes climate change a developmental challenge amongst the local communities of Madibogo village?
- How is the local people's knowledge contributing towards climate change adaptation and mitigation at local level?
- What are the physical and photographic evidence visible in the landscape as effects of climate change in Madibogo village?
- What is the impact of environmental degradation on the local residents of Madibogo village?

1.5 Rationale and Justification for the Study

The word rationale is a noun defined in the free online dictionary as, a set of reasons or a logical basis for a course of action or a particular belief.

The rationale of the study was that when the researcher was still growing up, she learnt that a year comprised 4 seasons namely, summer, spring, autumn and winter, which she personally experienced and became convinced of. Having grown up in Madibogo, a remote rural area with no firms or industries where people could seek employment opportunities, most of the community members were highly dependent on subsistence farming as their primary source of income. However, as years passed the researcher realized that farming activities were declining and a large number of rural people started migrating in search of employment opportunities in urban areas where there were industries. This led to social problems related

to the break-up of family units, due to heads of families moving out looking for jobs and this impacted negatively on the lives of woman in particular. Poverty and unemployment became the order of the day; farmers became confused as they could no longer understand the right time for planting nor harvesting. They continued working at a loss whilst others completely stopped their farming activities, mainly because of excessive, unfavourable weather and rainfall patterns. The researcher therefore became concerned as an individual. The concepts “climate change” and “global warming” started dominating newspapers, radios and television locally, nationally and internationally. This background influenced the researcher to undertake a study on the topic so as to get more information and contribute to finding answers to the problem. Moreover, the global planning and discussion vacuum in addressing climate change, in respect of the role played by African Indigenous Knowledge System also influenced the researcher as a student of IKS and Climate Change to undertake this study.

The study is intended to contribute towards finding answers to the changed lifestyle and ecosystem in Madibogo where the researcher originated. It was also to form a knowledge base for future academic research, students in IKS, and come-up with new ideas and issues that will assist in finding more answers to the problem. This was to also form a knowledge base that was to support other communities to constantly adapt to changing and varying climate.

Moreover, there was a general need to find answers to the problem as climate change can lead to conflicts which occur in different regions of the world such as conflict over resources; economic damage and risk to coastal cities and critical infrastructure; loss of territory and border disputes; environmentally-induced migration; situations of fragility and radicalization; tension over energy supply and pressure on international governments (Climate Change and International Security, 2008:3).

As such, the study intended to explore the role played by IKS in climate change adaptation and mitigation, as well as ways in which African Indigenous people had integrated mitigation and adaptation into their livelihood strategies to reduce their vulnerability to climate change.

1.6 The General Aim of the Study

Based on the rationale of the study above, the general aim of the study was to investigate the challenges and prospects of incorporating African Indigenous Knowledge Systems in local development and climate change policy strategies.

1.6.1 The Specific objectives

Subsequent to the general aim of the study above, the specific objectives of the study were these:

1. To analyze the impact of climate change as a developmental challenge amongst the local community of Madibogo village.
2. To assess the contributions of local people's knowledge towards climate change mitigation and adaptation strategies at local level.
3. To explore physical and photographic evidence visible in the landscape as causes of climate change in Madibogo village.
4. To evaluate the impact of environmental degradation on the local residents of Madibogo village.

1.7 Organization of the Final Report

The research report will be organized into five (5) chapters. Each chapter focuses on a particular stage of the entire research process. Thus, the chapters are organized as follows;

1.7.1 Chapter One : Introduction

This chapter was to give the background to the problem of climate change as a threat to global sustainable livelihood and development and to define the problem. This included various efforts made internationally to address the problem, as well as IKS and its role in climate change adaptation and mitigation in developing countries and Africa in particular. The statement of the problem was also to be reflected, along with research questions, rationale of the study, as well as the aim and specific objectives.

1.7.2 Chapter Two: Literature Review

Chapter two outlines the relevant theoretical frameworks relating to local development, IKS and climate change. With literature review, a lot is to be learnt and understood with the intention to avoid the tradeoffs, traps and pitfalls experienced by the previous researchers. Prior research will also be reviewed to assist in ensuring that the current research covers the major relevant constructs, found and selected appropriate measurement instruments as well as anticipated common problems in the current research context. The chapter will also look at the major concepts, conclusions, theories and arguments that underline the work, and look for similarities and differences with closely related work.

1.7.3 Chapter three: Methodology

Chapter three reflects the methodology and methods on how the research is to be conducted. The chapter will provide useful information relating to the process of data collection, and management, research ethics and ideas or approaches for data analysis processes (constituting a process of developing analytical memos). The chapter will close with reflections on the entire research methodology and how it worked out and what were the lessons learnt from the process.

1.7.4 Chapter four: Data Presentation

In this chapter the data that was gathered from the field will be analyzed in detail and provide all the relevant evidence required to answer the research questions. This chapter was regarded as important because it was where gathered data was to be processed into evidence that will be used to develop analytical statements answering the set research questions.

1.7.5 Chapter five : Conclusion and Recommendations

This chapter will come up with recommendations for the possible integration of local knowledge into the local development and climate change policy strategies of Ratlou Local Municipality.

1.8 Definition of terms

There were various terms with different definitions reflected in this study that will be defined within the context of the research. The following definitions of terms were utilized:

1.8.1 Local development: is defined as a state in which the local area is improved, expanded, enlarged or refined to meet the needs of the present without compromising the ability of future generations to meet their needs and can be measured using indicators of environmental quality.

1.8.2 Climate change: According to the 8th meeting of the Africa Partnership Forum held in Berlin, Germany on 22-23 May 2007 climate change refers to, any change in climate over time that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. Usage of the term varies between the International Panel on Climate Change (IPCC) that refers to any change in climate, whether due to natural variability or as a result of human activity and the UN Framework Convention on Climate Change that refers only to natural variability causes. Some voices argue that climate change is a cultural phenomenon that is reshaping understandings of humanity's place on Earth (Hulme, 2009), while others warn that we do not seem to have the slightest understanding of the seriousness of our plight' (Lovelock, 2009:4).

Moreover (O'Brien K et al, 2010: 4) argue that climate change is a problem that can only be resolved by focusing on climate change as an issue of human security, which includes a thorough investigation of what it means for humans to be 'secure'. He argues that the 'environment' discourse pays little attention to people's possibility, or their values, beliefs and world views, and it ignores the importance of equity and solidarity in both adaptation and mitigation. He then presents human security as an alternative way of framing the challenges of climate change.

1.8.3 Climate Change Adaptation methods are defined by (Nyong, 2007: 791) as those strategies that enable the individual or the community to cope with or adjust to the impacts of the climate in the local areas. Such strategies included the adoption of efficient environmental resources management practices such as the planting of early maturing crops, adoption of hardy varieties of crops and selective keeping of livestock in areas where rainfall declines. He further argues that those strategies also include the use of technological products that

enable the individual to function in the “new” condition. Obviously, adaptation strategies are expected to be many, and their combinations in various ways are required in any given location. Adaptation was not only found to be about reducing risk. It was about creating the conditions for response, not only within a central structure but also throughout society as a whole (O’ Brien et al, 2010: 86).

1.8.4 Climate Change Mitigation Strategies refer to procedures or activities that help prevent or mitigate the process of climate change (Swart et al., 2003). Thus, mitigation strategies could be grouped into two categories: some represented mainly technological solutions; others involved changes in economic structure, societal organization, or individual behaviour (Nyong, 2007:791).

1.8.5 Vulnerability – means, finding it difficult to adapt due to high exposure, high sensitivity and low adaptive capacity (O’Brien et al, 2010: 85). Elderly people inherently vulnerable to extreme weather were the first to experience high mortality during heat waves and colds spells, as shown in the European heat wave in 2003 (Poumadere et al, 2005 in O’Brien et al, 2010:85). He argues that the second reason that the vulnerable find it difficult to adapt was that they had limited access to public assistance and external resources. In other words, the capacity to adapt to climate change impacts is intimately bound up with capacity to access decision makers, engage in political processes, and access resources at times of crises.

1.8.6 Indigenous Knowledge refers to what indigenous people know and do, and what they have known and done for generations – practices that evolved through trial and error and proved flexible enough to cope with change (Melchias, 2001:35). Sharing the same sentiment with Melchias on this definition are Osunade 1994 and Warren 1992 who believe that Indigenous Knowledge is an institutionalized local knowledge that has been built upon and passed on from one generation to another by word of mouth. It is the basis for local-level decision-making in many rural communities. Indigenous knowledge has value not only for the culture in which it evolved, but also for scientists and planners striving to improve conditions in rural localities (Mundy and Compton 1991 in Melchain, 2001:35). These definitions imply that indigenous knowledge systems are dynamic - not static, as the word “traditional” was commonly interpreted. It means that these indigenous knowledge systems are constantly in a form of flux as new knowledge is added to existing sets of knowledge, and that the newer sets of knowledge then start to construe the indigenous or local body of

knowledge. This is why IKS is more than just technologies and practice, and includes aspects like information, practices and technologies, beliefs, tools, materials, experimentation, biological resources, human resources, education, and communication - all within the logic of the holism of a specific cultural setting (Els, 2012).

1.8.7 Indigenous knowledge systems:

Indigenous Knowledge System (IKS) is human experiences, organized and ordered into accumulated knowledge with the objective to utilize it to achieve quality of life and to create a livable environment for both human and other forms of life (Serote, 2001, online <http://osarome.blogspot.com/2011/12/write-on-value-of-indigenous-knowledge.html>)

Indigenous knowledge systems (IKS) refer to the complex set of knowledge, skills and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area (Smit et al 2012: 130). IKS constitute the knowledge that people in a given community had developed over time, and continue to develop. It is the basis for agriculture, food preparation, health care, education and training, environmental conservation, and a host of other activities. Indigenous knowledge is embedded in community practices, institutions, relationships and rituals.

1.9 Conclusion

This chapter provided a detailed overview of the conceptualization, and rationale of this research. The chapter further provided the background. In the next chapter, the researcher will proceed to search for and review literature on what had been done already to identify problems and to answer specific questions to provide rationale for the proposed study.

1.10 Acronyms and abbreviations

The following list of acronyms and abbreviations were used.

- ACCID:** The African wide Civil Society Climate Change Initiative for Policy Dialogue
- AFOLU:** Agriculture, Forestry and Land Use
- CCIS:** Climate Change and International Security
- CDM:** Clean Development Mechanism
- CO₂:** Carbon Dioxide
- COMESA:** Common Market for Eastern and Southern Africa
- COP 12:** Conference of the Parties No. 12
- COP 16:** Conference of the Parties No. 16
- COP 17:** Conference of the Parties No. 17
- EAC:** The East African Community
- EU:** European Union
- FANRPAN:** Food, Agriculture and Natural Resources Policy Analysis Network
- GHG:** Greenhouse Gas
- GCM:** General Circulation Model
- IDP:** Integrated Development Plan
- IGBP:** The International Geosphere-Biosphere Programme
- IK:** Indigenous Knowledge
- IKS:** Indigenous Knowledge Systems
- IPCC:** Intergovernmental Panel on Climate Change
- IUCN:** The International Union for Conservation of Nature
- JPoI:** Johannesburg Plan of Implementation
- LA 21:** Local Agenda 21
- MDG:** Millennium Development Goals
- NCCRSSA:** National Climate Change Response Strategy for South Africa
- NEMA:** National Environment Management Act
- OECD:** Organization for Economic Co-operation and Development
- PRO-AFALU:** Professional market platform on agriculture, forestry, husbandry and
Fishery
- SADC:** Southern African Development Community

SASSA – The South African Social Security Agency

UNFCC: United National Framework Convention on Climate Change

WSSD: World Summit on Sustainable Development

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL DISCUSSIONS

2.0 Introduction

In chapter two the researcher unpacked and explored the definition of the word “climate” before defining the compound word “climate change”. The chapter enabled the researcher to understand the effects of climate change in developing regions, in order to come up with different theories and perspectives on global climate change and how global climate change addressed the issue of IKS. It also enabled the researcher find out whether the idea she was working on had been thought of by other researchers before or not. This was where the researcher learnt a lot, understood and avoided trade-offs traps and pitfalls experienced by the previous researchers. Prior research findings also played a major role in assisting to ensure that the current research covered all the major relevant constructs and to select appropriate measurement instruments and anticipated common problems in the current research context. Moreover, the chapter helped the researcher to look for the major concepts, conclusions, theories and arguments that underlined the work. Similarities and differences on closely related work were also explored.

The chapter provides an orienting overview regarding the status of climate change within local development, the contested explanations that have developed and narratives (challenges and opportunities) on the integration of climate change adaptation and mitigation strategies into local development policies. The chapter discusses some of the research findings and recommendations regarding integration of these strategies into local development policies. Efforts were made to locate and situate this research project so as to develop a perspective for conducting such a project.

2.1 What is climate change?

The term “climate change” has become an important topic in atmospheric, oceanic and environmental sciences. However, in order to understand the concept of climate change, the researcher attempted to firstly understand the meaning of the term “climate” itself before entertaining the different scholars and researchers’ definitions of the compound term “climate change”

According to Neelin (2012:1) climate is commonly thought of as the average condition of the atmosphere, ocean, land surfaces and the ecosystems that dwell in them. He further argues that climate also includes the average wind direction and strength, average cloud cover, the temperature of the sea surface nearby, which affects the previous quantities, and the ocean currents that affect the sea surface temperature, and so on. He advises that while we might care most about the local climate in the land regions where we live, this interconnectedness of the climate system implies that it has to be studied globally.

While this is not the only way of defining the term climate, it has become commonly used and provides a convincing vantage point. Based on what the term “climate” means, different climate change researchers, and scholars have defined “climate change” in different ways. The researcher worked with varying definitions to arrive at a conceptual framework of what the term “climate change” referred to within the context of this research.

According to the International Panel on Climate Change (IPCC) climate change is any change in climate over time that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

Usage of the term varies between the Inter-governmental Panel on Climate Change (IPCC 2001a) that refers to any change in climate, whether due to natural variability or as a result of human activity and the UN Framework Convention on Climate Change that refers only to natural variability causes (8th Meeting of the Africa Partnership Forum Berlin, Germany, 22-23 May 2007).

Some voices argue that climate change is a cultural phenomenon that is reshaping understandings of humanity's place on Earth (Hulme, 2009), while others warn that we do not seem to have the slightest understanding of the seriousness of our plight' (Lovelock, 2009:4). Moreover, (O'Brien K et al, 2010:4) argues that climate change is a problem that can only be resolved by focusing on it as an issue of human security. This includes a thorough investigation of what it means for humans to be 'secure'. He argues that the 'environment' discourse pays little attention to people's possibility, or their values, beliefs and world views, and it ignores the importance of equity and solidarity in both adaptation and mitigation. He then presents human security as an alternative way of framing the challenges of climate change.

A closer analysis of the above definitions led the researcher conclude that;

- ✓ Inherent in most of the above definitions and conceptions of “climate change” is the issue of change in climate over comparable time periods, caused by natural variability, and results of human activity.
- ✓ Climate change therefore appears to be any change in climate over comparable time periods due to natural variability causes or as a result of human activity.
- ✓ It is also critical to take the argument brought by Neelin, (2012:1) into cognisance when he argues that while we might care most about the local climate in the land regions where we live, the interconnectedness of the climate system implies that we have to study it globally, thereby being cautious and avoiding falling into the trap of misrepresenting climate change. Climate change is therefore regarded as the greatest environmental challenge facing this century. Although often referred to as ‘global warming’, global climate change is more about serious disruptions of the entire world’s weather and climate patterns.

Defining climate change from a critical and reflexive perspective, this research will move on the premise that, climate change is a development issue, and that only sustainable development can effectively confront the challenge (Tomlin and Hug 2006; Parry 2009 in Chikulu, 2011:2). Consequently, a greater realization emerged that climate change tends to have a greater impact on the poorer sectors of the populace. Those parts of the population that already suffer from poor health conditions, unemployment or social exclusion are rendered more vulnerable to the effects of climate change. This is due to the fact that the poor have the least capacity to manage risk and as a result make long - term adaptations. This realization has caused a shift in the focus of the climate change discourse from being primarily concerned with environmental issues, to include issues of poverty and sustainable development (Chikulu, 2011:2). This discourse will help the researcher to negotiate the often contested and sometimes politicized discourses around the debate on the value of climate change in local development policies. This view is also useful in exploring issues around integrating climate change mitigation and adaptation strategies into local development policies in Ratlou Local Municipality.

2.2 The Effects of Climate Change in Developing Regions including Africa.

The developed world, particularly the United States, is the largest producer of greenhouse gases due to industrialization and yet they are pressing Africa, which produces a tiny fraction of the world's greenhouse gases, and is particularly vulnerable to the effects of global warming, to reduce its greenhouse emissions. Major changes in precipitation patterns in Africa are experienced, which has led to food shortages and increased desertification. This is a major challenge as African nations lack the resources and technology to address such changes.

Africa, produces less than 4% of global greenhouse gases, but has seen glaciers shrink and lakes evaporate. Poor environmental practices on the continent, including deforestation in countries such as the Democratic Republic of Congo, are complicating the challenges Africa will face as global warming undermines agriculture and leads to further desertification and erosion.

According to the United Nations Environment Programme Report of 2008, the glaciers on Mt. Kilimanjaro in Tanzania and the Rwenzori mountains in Uganda were reported to have shrunk by 50% since the late 1980s and that Scientists estimate that Rwenzori glaciers will be gone in 20 years, (R. Dixon, 2008).

Global climate change has brought about negative effects on Africa's ability to cope with climate change. These include poverty, illiteracy and lack of skills, technology and information, low levels of primary education and health care, poor access to resources, low management capabilities and armed conflicts. The overexploitation of land resources including forests, increases in population, desertification and land degradation pose additional threats (UNDP, 2006).

The climate in Africa is more variable, and extreme weather is being experienced more frequently as a result of global warming. This increases the risk to human health, life, by drought and flooding in many areas of the continent. Africa is also experiencing water scarcity and stress with a subsequent potential increase of water conflicts as almost all of the 50 river basins in Africa are trans-boundary (Ashton et al, 2002:18). Due to severe weather conditions in Africa, agricultural lands are lost, with shorter growing seasons and lower yields. Moreover, there is a general decline in most of the subsistence crops.

According to the South African National Response Strategy of 2004, about 70% of total production in South Africa consists of maize. However, an increase in temperature makes it difficult for positive crop yield returns as a hotter drier climate causes reduction in maize production. This mostly affects specialty crops grown in specific environmentally favourable areas as it causes an increase in pests and diseases which have a detrimental effect on the agricultural sector and invasive plants. For example, the South African forestry sector is sensitive to climate change as it is based on plantations of non-indigenous species, located in relatively marginal areas, which compromise about 1.5% of the land area of the country.

In 2007, the effects of climate change were reported as being small, but were projected to progressively increase in all countries and regions (Confalonieri et al, 2007: 393), the effects of which are currently being felt as larger effects.. Some of the effects of climate change within the health sector include the health status of millions of people being affected through, for example, increase in malnutrition; increased deaths; diseases and injury due to extreme weather events; increased burden of diarrheal diseases; increased frequency of cardio-respiratory diseases due to high concentrations of ground-level ozone in urban areas; and altered spatial distribution of some infectious diseases. The effects also include an increase in the occurrence of strokes, skin rashes, dehydration and the incidence of non-melanoma skin cancers.

The rising temperatures are changing the geographical distribution of disease vectors which are migrating to new areas and higher altitudes due to climate change. For example, migration of the malaria mosquito to higher altitudes will expose numbers of previously unaffected people to infection in the densely populated East Africa highlands (Boko et al., 2007). Future climate variability will also interact with other stresses and vulnerabilities such as HIV/AIDS (which is already reducing life expectancy in many African countries), conflict and war (Harrus and Baneth, 2005), resulting in increased susceptibility and risk of infectious diseases (e.g. cholera and diarrhea) and malnutrition for adults and children (WHO, 2004).

Climate change is an added stress to already threatened habitats, ecosystems and species in Africa, and is likely to trigger species migration and lead to habitat reduction. Up to 50% of Africa's total biodiversity is at risk due to reduced habitat and other human-induced pressures (Boko et al. 2007).

2.3 Different Theories and Perspectives on Global Climate Change

The global warming controversy includes a variety of disputes about the nature, causes, and consequences of global warming. The debates have been more in the popular media than in the scientific literature. The disputed issues involve the causes of increased global average air temperature, especially since the mid-20th century; whether such a warming trend was unprecedented or within normal climatic variations; whether humankind had contributed significantly to it, and whether the increase was wholly or partially an artifact of poor measurements. Additional disputes concerned estimates of climate sensitivity, predictions of additional warming, and what the consequences of global warming could be.

In the scientific literature, there was a strong consensus that global surface temperatures had increased in recent decades and that the trend was caused mainly by human-induced emissions of greenhouse gases. According to the Geophysicists Theory of Global Warming, human activity was the cause of global warming. This Theory argued that the earth was warming up, due to carbon dioxide emissions, mainly from petrol and burning of coal.

However, other theorists such as Professor William Happer objected to this position and challenged the belief that human activity was contributing to global warming. Sharing the same sentiment with Happer was Vladimir Shaiduroy of the Russian Academy of Sciences who believed that the apparent rise in average global temperature recorded by scientists over the last hundred years or so could have been due to atmospheric changes that are not connected to human emissions of carbon dioxide from the burning of natural gases and oil. According to this theory, changes in the amount of ice crystals at high altitude could damage the layer of thin, high altitude clouds found in the mesosphere that reduce the amount of warming solar radiation reaching the earth's surface.

2.4 How Global Climate Change Policies Address the Issues of Indigenous

Knowledge Systems (Kyoto Copenhagen & COPS)

African Indigenous Knowledge Systems were not taken into consideration in the design and implementation of modern mitigation and adaptation strategies. As such, previous researchers had put more emphasis on monetary, knowledge and technology transfer from developed to developing countries, and yet traditional and indigenous peoples' own coping and adaptive strategies were hardly recognized. Furthermore, in the text of the United Nations Framework

Convention on Climate Change (UNFCCC) indigenous and traditional peoples were not explicitly discussed in relation to climate change (Macchi, 2008:9).

The findings of the IUCP report after analyzing the treatment of indigenous people in climate change policy documents, including the United Nations Framework Convention on Climate Change (UNFCCC) (1992); the Kyoto Protocol and the Clean Development Mechanism (1998); the Stern Review (2006) and the Fourth IPCC Report (2007), was that even though these documents agreed that the costs of climate change were going to fall inequitably on the world's poorest and most disadvantaged communities including traditional and indigenous peoples, the communities discussed almost exclusively lived in developed countries, i.e. in North America, Europe, Australia and New Zealand and the Polar Regions. The majority of traditional and indigenous peoples who live in the tropical developing world got very little or no consideration. Besides, while all the analyzed documents put their emphasis on monetary, knowledge and technology transfer from developed to developing countries, traditional and indigenous peoples' own coping and adaptive strategies were hardly recognized (Macchi, 2008:4).

2.5 Why was there a sudden interest in indigenous knowledge systems over the last three decades?

According to (Zanu, 2007: 21), there were many stories and explanations relating to why people the world over started to develop an interest in indigenous knowledge systems. He argues that those stories certainly differed and no one of them could claim to be the absolute truth. However some of those stories relate to one another and as such could be used in combination to shed more light on the increased recognition of the potential that indigenous knowledge systems had in helping communities to attain sustainable livelihoods. Zanu shared the three main stories (theoretical perspectives) that could help one to understand and appreciate the changing trends in the way people worked with and perceived indigenous knowledge systems.

2.5.1 Failure by Science to provide adequate answers to the global environmental crisis.

According to (Dei, 2000) cited in (Zanu, 2007: 21) the recognition that the best impacts of scientifically informed solutions to environmental problems were not always the best solutions forced people to reconsider indigenous knowledge as an alternative. Moreover, Reid et al.(2004); Mokuku (2004); and Shava, (2005) concurred with Dei (ibid) when

pointing out that the current renewed interest in indigenous knowledge has been as a result of increasing lack of confidence in western science as a response to the world's worsening environmental problems. Shiva (in Dei et al., 2000: viii) highlighted examples of use of western scientific methods of agriculture i.e. use of pesticides, how the world was beginning to question the impact of western scientific knowledge as a response to the different local and global ecological problems. Shiva (ibid) argued that western scientific knowledge systems had failed the world and instead created more problems than solutions. Shiva's argument concurred with Beck's 1992 claim that the current global environmental crisis was a product of technological advances that characterized modern societies. Taking it further, (Odora, 2002) cited in (Shava, 2007) and (Le Grange, 2004) who claimed that western science failed to provide answers to all environmental problems that the world is faced with, hence the need to consider other knowledge forms when dealing with environmental issues and risks.

2.5.2 A struggle for intellectual freedom

On the other hand the renewed interest in indigenous knowledge as an alternative to western scientific knowledge seems to have emanated from the fact that across the world "indigenous" people themselves have now realized how their own knowledge practices were marginalized, subjugated and dominated by western scientific knowledge systems (Dei, 2002: xiii) cited in (Zanu, 2007: 21). In support of this argument (Dei, 2002) claimed that:

Indigenous knowledges are emerging in the present day as a response to the growing awareness that the world's subordinated peoples and their values have been marginalized...by the rise in influence of western industrial capital (p. 6).

2.5.3 Indigenous Knowledge as an Economic Venture

Reid et al., (2004: 240) cited in (Zanu, 2007: 24-25) brought a third dimension to the renewed interest in indigenous knowledge systems. He argued that the renewed interest in indigenous knowledge was also linked to the economic interests of large commercial organizations (also known as trans-national corporations - TNCs). Across the world these large commercial organizations were investing in research on indigenous knowledge, for instance studies on indigenous knowledge systems pertaining to exploration of medicinal properties and uses of certain indigenous wild plants species, not because this knowledge needed to be shared within the local communities but because of the potential that the knowledge and its application had in terms of commercial and profit making ventures.

This third dimension to the renewed interest in indigenous knowledge might have not related directly to the focus of this research but it has varied implications for indigenous knowledge research. Notably this explanation provide useful insights into the plethora of indigenous knowledge research projects that have become so popular over the last three decades. It also helped the researcher to appreciate the possible hidden motives behind corporate sponsorship of some of the indigenous knowledge research projects. Most importantly this explanation was very useful as it can also be used to trace and understand issues around appropriation of knowledge systems; issues around monopoly of knowledge and copyrights related matters that have also been part and parcel of the entire discourse of what is valid knowledge, how is it generated and best represented and who owns it.

2.6 What has been researched before?

Indigenous Knowledge

The research conducted in 2008 on the Indigenous Knowledge in Disaster Management in Africa, by IGAD Centre for Climate Prediction and Application (ICPAC) found that indigenous knowledge systems have enabled the various communities in Kenya, South Africa, Swaziland and Tanzania to live in harmony with their environments for generations, and the systems were important tools in environmental conservation and natural disaster management. Nearly all the communities had powerful structures that exercised authority to ensure smooth compliance with the observances and rules of indigenous knowledge. The study further provided valuable insights into how those communities interacted with their environment. It documented the various ways the communities relied on indigenous knowledge to sustainably utilize their natural resources.

Moreover, the indigenous knowledge systems provided them with a variety of options and innovations to deal with the challenges of nature conservation and disaster management in the course of making a living. The knowledge systems were particularly evident in agricultural production, food preservation and storage, healthcare, and in dealing with natural disasters. The communities had a vast fund of knowledge on prediction and early warning; time tested coping mechanisms, food production and storage techniques, and an impressive plant-based pharmacopoeia for both human and animal health. For instance, in the field of prediction and early warning of disasters, the Luo community in the Lake Victoria basin had a large number of climate monitoring indicators that enabled them to tell such things as the right time to start planting in anticipation of the rains or to preserve and store food in

anticipation of a dry season. These indicators included observation of the behaviour of animals, birds, reptiles, amphibians, insects, vegetation and trees, winds, temperatures and celestial bodies.

Likewise, in the area of animal health, the Maasai, who inhabit both Kenya and Tanzania, had at least half a dozen different medicinal plants for treating East Coast Fever alone in cattle. In farming technologies, the Matengo people, believed to have lived on the steep slopes of Matengo Highlands since the Iron Age, had developed a sophisticated system that enabled them to grow crops on hillsides while at the same time controlling soil erosion and improving soil moisture and fertility.

2.7 Challenges and Opportunities for incorporating IKS into climate change policies.

The dominant knowledge destroys the conditions for local alternatives to exist (Vandana Shiva cited in Kincheloe, 1999: 289). In other words, 'local knowledge is made to disappear' when the dominant system negates its existence, or when it erases or destroys the reality which the local knowledge attempts to represent (1993:9, 12). Consequently, imported Western methods and technologies often fail because the "experts" simply did not understand the people they were trying to help, and failed to take local knowledge and attitudes into account.

A library of Africa had been destroyed and will continue to do so, should IKS scholars not take a leading role in re-building it. Rare are the occasions when indigenous knowledge is not spoken of as an enabling step for development (Kincheloe, 1999: 288). When IK contributes to the cause of development, it is viewed as having value; however, when it does not, it is labeled as irrational, misguided, or empirically unverifiable, and accordingly, in need of change. Brokensha and Riley's comments are revealing in this regard when argued that anyone who seeks to change the social and economic system of any people should first carefully examine existing indigenous knowledge and beliefs because; a) even if most beliefs proved to be empirically unverifiable, it would still be courteous, and efficacious to find out what people believe, before trying to persuade them to adopt new beliefs.... (1980: 113).

IKS did not exist in a vacuum and there is a need to incorporate it into other systems. The big question is "How"? And the answer is simple; "through those who hold power". Thus, as much as power was being used by the West to destroy IKS, Africans are now in power (government) and should in turn, use their position to retrieve IKS. As such, IK should be

seen as a resource that can be exploited for economic growth, i.e. a knowledge resource that is appropriated for projects such as pharmaceutical or pesticide production. Diversity and pluralism are a characteristic of non-western societies. Africa has a rich biodiversity of plants for food and medicine. Agricultural diversity and the diversity of medicinal plants have in turn given rise to a rich plurality of knowledge systems in agriculture and medicine (Dei et al, 2008: v).

Moreover, the provision of compensation for IK promotes conservation of biological resources since indigenous cultures have maintained their knowledge precisely because they have remained largely isolated from industrial and market systems. As such the provision of compensation, however, ethically congruent with western values, signals the end of isolation.

We need to challenge certain systems that are pushing towards mainstreaming IKS as this translates to insubordination and an insult to our system. There is a need to ensure that the voices of our people are heard by those who are in power by advocating for community consultation. The absence of community consultation or Public Participation by those who are in power demonstrates the western style of doing things and that the African minds are far from being liberated. Africans are still imposing development projects instead of consulting with the community, establishing their needs and prioritizing them. This emerges as a huge challenge facing our democratic system.

It is evident that change is necessary to develop a sustainable society, and it is much better for the populace to work together to that end than to separate into communal or a hermit type of existence. There is a changing of the winds and green energy has become more acceptable, bringing the social aspect online. Environmentalist Lester R. Brown believes that sustainable living is poised to make some deep inroads into society in the 21st century. The western system on the other hand, sees the world generally shifting to a renewable energy-based economy, reusing and recycling as necessary and developing a more diverse system of transportation to slow the use of the diminishing fossil fuels. Africans are slowly but surely adopting and incorporating these lessons through the green economy concepts.

Linking climate change to Sustainable development has caused a shift in the focus of the climate change discourse from being primarily concerned with environmental issues, to

include issues of poverty and sustainable development (Chikulu, 2011:2). Moreover, this discourse will help future researchers in negotiating the often contested and sometimes politicized discourses around the debate on the value of climate change in local development policies. It is from this premise that the researcher was able to explore possibilities and challenges around integrating climate change mitigation and adaptation strategies into local development policies in Ratlou Local Municipality.

Consequently, a greater realization has emerged that climate change tends to have a greater impact on the poorer sectors of the populace. Those parts of the population that already suffer from poor health conditions, unemployment or social exclusion are rendered more vulnerable to the effects of climate change. This is due to the fact that the poor have the least capacity to manage risk and thus make long term adaptations. For example, farmers in Madibogo were unable to cope with the climatic conditions; and were therefore unable to continue practicing subsistence and crop farming. This was reported as having been influenced by lack of capacity to manage natural risks and disasters such as drought.

2.8 Global recognition

Indigenous knowledge, particularly agricultural and environmental knowledge, gained international recognition after the United Nations Conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro. Furthermore, Agenda 21, one of the environmental agreements signed at UNCED, emphasized that governments and intergovernmental organizations should respect, record, and work toward incorporating indigenous knowledge systems into research and development programmes for the conservation of biodiversity and sustainability of agricultural and natural resource management systems. In addition, other international documents, such as the 1980 "World Conservation Strategy" by the International Union for the Conservation of Nature and Natural Resources (IUCN), also paved the way for the recognition of the important role played by indigenous knowledge in biodiversity and human development. As such, the value of indigenous knowledge systems in facilitating development is now gradually being recognized by governments and developments agencies.

2.9 Climate Change and Sustainable Development

The climate change effects felt by the participants was a clear indication that climate change is a development issue, and that only sustainable development can effectively confront the challenge. This argument is further attested by Tomlin and Hug (2006) and; Parry (2009) cited in (Chikulu, 2011:2). According to David Parry-Davies's article on Eco-Logic Publishing, the most commonly used definition of Sustainable Development is: *'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'*.

The above definition of sustainable development arose out of the Rio Earth Summit in 1992 and was used again at the World Summit on Sustainable Development (WSSD) in 2002 at which it was proposed that there are three dimensions of Sustainable Development; Social; Environmental and Economic. It was agreed that these three aspects of Sustainable Development are interconnected and interdependent to the extent that if any one of these elements is ignored or is over emphasized, it will destabilize the whole. This interpretation was widely accepted by most businesses and governments at the WSSD, and was simplistically represented by an equal sided triangle. This interpretation however was challenged by the environmental sector, and the escalating ecological crisis that we have experienced since then on a worldwide scale has given cause to re-evaluate this model of Sustainable Development. What has emerged since then is a more sophisticated and insightful model, in which it is seen that these three elements of Sustainable Development are not equal, but rather, hierarchical in that:

- A healthy Environment (Biophysical) is the primary and essential foundation, because, without a healthy environment with functioning ecosystems there can be neither society nor any economic activity. Therefore taking care of the environment is the first essential priority
- Society is the second priority – as without society, there can be no economic activity.
- The third element of Economy comes last – as the economy is entirely dependent on both the environment and society in order to exist at all.

Further to this hierarchical structure there was the added element of Policy which interpenetrated and affected all three elements above. This recognized that our social and

economic policies and strategies and our environmental laws and regulations – all played a critically important role and impacted all three dimensions of sustainability.

The researcher's interpretation of the delay in bringing developments to rural areas was that, the world's resources were finite, and growth that was unmanaged and un-sustained led to increased poverty and decline of the environment. Thus, humans owed it to future generations to explore lifestyles and paths of development that effectively balance progress with awareness of its environmental impact. In order to preserve the future, we had to appreciate the interconnectedness between humans and nature at all levels. Sustainable development practices could help us do this, and through education and building awareness, preserving the future is within everyone's reach. It is only through incorporating IKS in climate change policies that sustainable development can be attained thereby building a legacy for the future generations.

2.10. Euro-centric and Afro-centric Perspectives on Climate Change

Climate change is a recent phenomenon identified by scientists which affects both African and Western societies. Nevertheless, it is worth noting that the changes or irregularities in climatic systems in Africa coincide with and are felt the same way by the West. In addition to that, both systems believe that the climatic system is disturbed and that a human being can rearrange nature, but have different perspectives on the "How" part of explaining the causes and effects of climate change.

The West has a strong consensus that global surface temperatures have increased in recent decades and that the trend is caused mainly by human-induced emissions of greenhouse gases. In support of this thought is the Geophysicists Theory of Global Warming which believes that human activity is the cause of global warming. This is elaborated through the warming up of the earth, which is believed to have been caused by carbon dioxide emissions, mainly from petrol and burning of coal. However, central to the Western Thought is the issue of "individual benefits" towards fixation of the climatic system.

Contrary to that, the Africans have a strong belief that global warming is caused by the distortion of IKS and the adoption of western lifestyles. Thus, African methods are more cultural than scientific methods and this will be demonstrated in chapter four through the Ubuntu principle, which shows a benefit for the majority e.g. praying for the rain for the

benefit of the community as a whole or stopping the rain for the wedding to continue for the benefit of the majority.

2.11 Conclusion

In conclusion in this chapter the researcher unpacked and explored the definition of “climate change”, its effects on the developing regions and how global climate change addressed the issue of IKS. It also reflected on previous researches done on IKS, global recognition, climate change and sustainable development. Finally, the chapter gave the Euro-centric and Afro-centric perspectives on climate change. Eventually, the chapter helped the researcher to come up with major concepts, conclusions, theories and arguments that underlined the work.

CHAPTER 3

Research Methodology

3.0 Introduction

This chapter reflects the methodology and methods that were used to conduct this research. The chapter also discusses in detail the three main data generating methods, namely focus group interview, ethnographic notes and photo voice (photographic evidence) processes that were used to generate data for analysis. For each data collection method reference was made to the sampling techniques employed, the participants involved and the constraints encountered. Issues concerning research ethics, validity and trustworthiness are also covered.

3.1 The Research Methodology

The researcher decided to conduct this research within a qualitative descriptive research framework. The research design and methodology involved a three-phase data collection framework. Focus group interview constituted phase one, ethnographic data (statements from field notes) phase two, and photographic evidence from the field formed the third and final data generation phase. In line with the purpose (to explore opportunities and challenges for integration of indigenous knowledge systems into environmental education processes) and design of this research all the three data phases had a qualitative orientation (Terre Blanche & Durrheim, 1999: 6; and Connole, 1993). The use of qualitative research methods was critical because the researcher needed to develop deeper insights and understand the challenges and prospects of incorporating African Indigenous Knowledge Systems in local development climate change policy strategies.

Taking into consideration the community-based nature of indigenous knowledge systems (IKS) the researcher decided to follow a participatory case study approach and triangulation method.

3.2 The Case Study Method

The choice of a case study method as a framework within which this research was carried out was justified by the fact that the researcher wanted to move away from homogenizing

Africans, despite the cultural diversity in South Africa. The researcher wanted to let participants narrate stories and give testimonies in relation to the nature and purpose of the research, as well as to have an in-depth understanding of the research problem. Researchers such as Tellis (1997) and Macaulay (2007) in Smit (2012:191 & 41), define a case study as a detailed analysis of a person or group, especially as a model of social phenomena. They elaborate further that it is a form of qualitative descriptive research that is used to look at individuals, a small group of participants, or a group as a whole.

Bassey (1999) cited in CrytonZazu (2007:44) states that a case study has the potential to help a researcher to explore in-depth (because it often concentrates on only one case) socially complex phenomena, such as how people perceive and conceptualize their own learning processes and the different epistemological systems that are embedded within the learning itself, as is the case in this research whereby respondents relate their African epistemological systems on adapting to and mitigating against climate change.

Furthermore Patton (1980) argued in (Zazu, 2007: 44) that case studies are particularly useful where a researcher wants to study a particular group of people, a specific process or a unique situation in great depth. Such is the case for this research because it intends to focus attention on the Organic Intellectuals who are the knowledge holders within the context of indigenous ways of mitigating and adapting to climate change within Ratlou Local Municipality, with special reference to Madibogo village.

Robson (1993: 40) defined a case study as the development of detailed knowledge about a single “case” or a small number of related “cases”. He pointed out that the case study research method is of particular interest to a researcher wishing to gain a rich understanding of the context of the subject being researched. Janse van Rensburg (2001: 16) concurs with Robson (ibid) when she argues that the case study method enables a researcher to look at individual or small groups in a naturalistic setting, and be able to generate rich and detailed qualitative data on a phenomenon of interest. Ethnographic notes from the field justified this method.

Having said that, the researcher collected data about participants, using participants and direct observations, focus group interviews, ethnographic notes and photo voice (photographic evidence). She ensured that mistakes made by previous researchers were avoided at all costs by not inadvertently causing stigmatization of various populations. This was achieved firstly

by involving community members and secondly, by not jumping into drawing negative conclusions. Participatory research was particularly chosen in this project to ensure partnership between myself as the researcher and those affected by the issue under study, so as to promote their voices.

However, critics of the case study method believe that the study of a small number of cases can offer no grounds for establishing reliability or generality of findings. Others felt that the intense exposure to study of the case biases the findings. Some dismissed case study research as useful only as an exploratory tool (Spring 1997 online, 2013).

3.3 Triangulation method

In support of the case study approach, the researcher chose a triangulation technique because the dominant scholarship based in western studies or researchers had articulated and developed systems and research methods that were limiting and demeaned the local people by researching them without their involvement. Methodologies such as those used in anthropology had not assisted in developing a liberating theory for the rights of locals to represent themselves in development issues. Triangulation is often used to indicate that more than two methods are used in a study with a view to double (or triple) checking results and it is a powerful technique that facilitates validation of data through cross verification.

According to Cohen and Manion (2000) triangulation is defined as an "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint. Sharing the same sentiment on the above definition are O'Donoghue and Punch (2003) in O'Brien (2012), who define triangulation as a "method of cross-checking data from multiple sources to search for regularities in the research data examination from more than two sources."

Moreover, various social scientists such as, Bailey, Neviva and Professor Alan Bryman believe that triangulation offers the prospect of enhanced confidence, thereby increasing the credibility and validity of the results. Their argument is that data collected through triangulation is perceived as being valid and credible, simply translating to perfection and that there was no way that the findings could be inaccurate, incredible and invalid.

Other scholars including Altrichter et al. (2008) define triangulation throughout the years and contend that triangulation "gives a more detailed and balanced picture of the situation." They argue that triangulation in particular refers to the application and combination of several research methodologies in the study of the same phenomenon. Thus, by combining multiple observers, theories, methods, and empirical materials, researchers hoped to overcome the weakness or intrinsic biases and the problems that come from single method, single-observer and single-theory studies.

Denzin (1970) goes the extra mile by extending the idea of triangulation beyond its conventional association with research methods and designs. He distinguished four forms of triangulation:

- Firstly, *Data triangulation*, which entails gathering data through several sampling strategies, so that slices of data at different times and social situations, as well as on a variety of people, are gathered,
- Secondly *Investigator triangulation*, which refers to the use of more than one researcher in the field to gather and interpret data,
- Thirdly *Theoretical triangulation*, which refers to the use of more than one theoretical position in interpreting data,
- Lastly *Methodological triangulation*, which refers to the use of more than one method for gathering data. The fourth of these, as the preceding discussion implied, is the most common of the meanings of the term. Denzin drew a distinction between *within-method* and *between-method* triangulation. The former involves the use of varieties of the same method to investigate a research issue; for example, a self-completion questionnaire might contain two contrasting scales to measure emotional labour. Between-method triangulation involves contrasting research methods, such as a questionnaire and observation.

As such, the study used both the Theoretical and Methodological triangulation as central methods in this research through the inclusion of combined use of Quantitative Research and Qualitative Research to determine how far these arrived at convergent findings, and by using different theoretical positions in interpreting data.

- Qualitative data in the form of notes (ethnography) were transcribed and translated from Setswana into English. Interview and participant observation notes were typed and content analysis conducted.
- In this study Batswana community knowledge holders on the research problem such as community elders and farmers in the study community were actively involved in the research process. The study was conducted among the Barolong Boora -Tlou Ba GaPhoi ethnic group in Madibogo, Tlhaping section in particular, within Ratlou Local Municipality.
- Having been born and grown up in the research area, the researcher applied a purposive sample of 10 respondents (6 women and 4 men) in the study. Battaglia, (2010) in Smit et al (2012:133) defines a purposive sample as a type of non-probability sample in which the elements to be included in the sample are selected by the investigator on the basis of special characteristics of the respondents. In addition to that definition, Lavrakas, (2009) in Smit et al (2012:133) elaborates that it is a sample selected in a deliberate and non-random fashion to achieve a certain goal. Women were given a high representation in the sample because they are the main knowledge holders and custodians of the major activities of community life such as agriculture, health care, food security, natural resource management, and they have a wide indigenous knowledge of environmental conditions including climatic changes etc. (Smit et al 2012:133).

3.4 Research Ethics

Given the communal ownership of the research area, certain ethical matters were taken into consideration as follows;

- ⚡ Protocol - The tribal chief as the custodian of communal land ownership was firstly consulted to seek permission for conducting a research in the area, and to be abreast of what was to happen in the village at all times. As such the tribal office of Kgosi Phoi became the entry point to the village wherein permission to collect data was solicited and granted.
- ⚡ The second office to be consulted was the Ratlou Local Municipality, as the key institution for implementing developmental projects. The ward councilor was consulted through the office of the speaker as the one responsible for public

participation, as well as the Integrated Development Planning unit. It was critical to consult with the Integrated Development Planning office as the driver of planning, which involved the entire municipality and its citizens in finding the best solutions to achieve good long-term developments. The rationale behind consulting this particular office was to close the gap that left rural areas underdeveloped and largely under-served by the apartheid era, by advocating the incorporation of IKS in developmental planning.

- ✦ The researcher observed principles of openness, transparency and honesty about the research purpose and implications for participation in the research.
- ✦ The language barrier was also taken into account whereby the questionnaire was prepared in Setswana and the interviews were also conducted in the interviewee's home language.
- ✦ Respect, dress code and the way of addressing elderly people was also taken into consideration during the process of data collection.

3.5 Reflections on the research methodological processes

The journey of this research project brought about a number of lessons that are worth sharing as such:

- ✓ Contingency plans had to be put in place to address the issue of time management as things did not always work out the way the researcher had initially planned. Data had to be collected during weekends because the researcher is a public servant who was committed during the week. Nonetheless, the researcher had to re-schedule data-collection visits over and over again as it was difficult to get participants since they were always held up by either attending funerals or other cultural activities on weekends.
- ✓ Back-up systems were put in place, which enabled the researcher to achieve the set objectives. For example, manual notes taking were taken during interviews instead of the audio recording machine as initially planned, due to financial constraints.

- ✓ The researcher could not just wipe away the anthropology of Setswana concepts by forcing translation of Tswana terms into English for fear of compromising the actual meaning in the process. The best thing the researcher did was to write the terms in the language of the respondents (Setswana) and provided a footnote that translated words from Tswana to English.
- ✓ Unfamiliarity of key terms – It was easy for the researcher to seek clarity during the interview where she could not understand as she understood the language of the respondents.
- ✓ The respondents felt comfortable to divulge certain information because the researcher originated from the research area and had thoroughly introduced herself and even quoted some of the elderly people from her family to ease and built trust and confidence in participants.

3.6 Conclusion

This chapter outlined the research methodology and how the researcher had worked with it. In chapter four the researcher took a careful look at how the data generated in this chapter was presented and analysed.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

4.0 Introduction

In this chapter the researcher outlined the processes that constituted the data analysis stage. It reflects a detailed amount of the theoretical frameworks used related to the descriptive and interpretive nature and orientation of qualitative research such as this project. It also provided the relevant evidence required in answering the research questions. This chapter was key as it was where the data gathered from the field was processed into evidence that was later used to develop analytical statements in response to the set research questions. From the discussion of the theoretical frameworks employed this chapter moved on and made a careful presentation of the generated data, making the data ready for interpretation.

4.1 Theoretical Frameworks for quantitative Data analysis

In order to understand the socio-economic and demographic characteristics of the respondents, a quantitative analysis of data had to be explored for quantifiable and easy understanding of results. Quantitative data was analyzed in three levels of measurement such as nominal, ratio scale and Interval or Likert scale which was used to rank on a scale of 1-5.). Nominal measurement is a tool used to measure data that is not logical but has a basic classification e.g. to indicate whether the participant was a male or female. Ratio is a measurement tool for data that is continuous, ordered and has standardized differences between values, and a natural zero. A Questionnaire was administered wherein respondents were requested to indicate their age, if they are recipients of the old age grant, monthly income, gender, place of birth and years stayed in Madibogo.

4.2 Theoretical Frameworks for Qualitative Data analysis

Qualitative data was analysed using two analysis theoretical frameworks, “Thick Descriptions” and “Reduction and Interpretation”. The two theoretical frameworks served to guide both the data analysis and interpretation processes as in many cases the two processes are closely intertwined and are often done concurrently (O’ Leary, 2004) cited in (Zazu, 2007: 60). Quantitative data or socio-economic demographics were analysed through the nominal, ratio and likert scale measurement.

4.2.1 Thick Descriptions

Due to the qualitative nature of this research the Thick Description approach to data analysis was used. According to Denzin (1989), Thick Description tries to rescue (extract) the meanings, actions and feelings of the people or phenomena we are observing. In focussing on "meanings" it lies at the heart of qualitative, non-positivist methodology.

A thick description does more than record what a person is doing. It goes beyond mere fact and surface appearances. It presents detail, context, emotion, and the webs of social relationships that join persons to one another. Thick description evokes emotionality and self-feelings. It inserts history into experience. It establishes the significance of an experience, or the sequence of events, for the person or persons in question. In thick description, the voices, feelings, actions, and meanings of interacting individuals are heard. (Denzin, 1989: 83).

What it implied was that the researcher had to develop thick descriptions of the qualitative data that was generated through the focus group interviews, ethnography and photographic evidence from the field. Accordingly much of this chapter is a representation of thick descriptions of the issues emerging from the data collection and relating to the focus of this research project and the specific questions as outlined in chapter one. Each of the themes or issues that emerged from the data collection process linked to the possibilities of integrating indigenous knowledge systems into the Climate Change mitigation and adaptation strategies of Ratlou Local Municipality. This constitutes quite an important part of the data analysis within this research project. The thick descriptions are very important as they allow the researcher to process data into meaningful evidence that was used in the data interpretation stage.

4.2.2 Reduction and Interpretation

The researcher also applied the data analysis technique of reduction and interpretation. According to Marshall & Roman (1989) cited in Creswell (1994: 114), data analysis technique means taking the thick descriptions (voluminous amount of data) and reducing it into certain patterns, categories or themes and then interpreting it. Devos and Fouche (1998, :203) refer to this approach to data analysis and interpretation as a process of breaking data into constituent parts to obtain answers to research questions.

4.3 Analysis of the Socio-Economic and Demographic Characteristics of Respondents

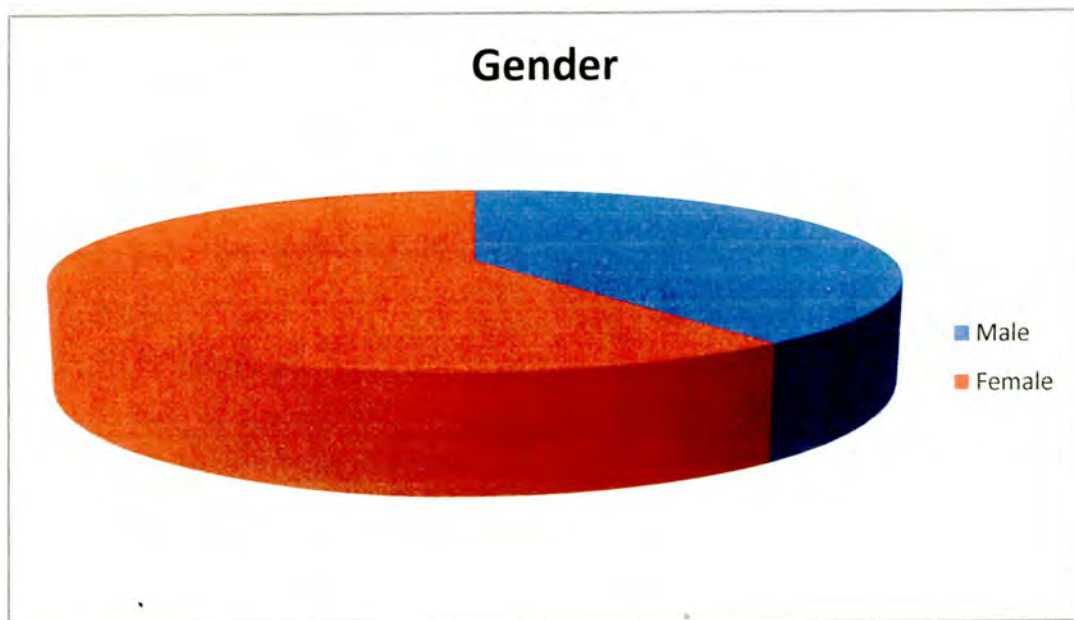
It was important for the researcher to thoroughly describe participants in this study so as to allow readers and other researchers to determine to whom the research findings are generalisable and allow for comparisons to be made across replications of studies. It also provided information needed for research syntheses and secondary data analyses online (Bein, 2009). Moreover, it is through the result of these analyses, that gaps in existing bodies of research can be identified as well as universals and variations that occur within and between populations of the study.

4.3.1 Gender

The chart below indicates the percentage level of gender of respondents.

Table 1.

Gender of Respondents



Women were given a high representation in the sample (60%). This is because they were the main knowledge holders and custodians of IKS, but also because their life expectancy was higher than men. Men were given a small representation of 40%.

It was against the above rationale that the researcher incorporated both the demographic and socio-economic characteristics of respondents into the administered questionnaire.

Age of Respondents

Table No. 2

Male		Female	
40%	45+	60%	45+

The researcher examined the age group of the respondents in the study as in most indigenous communities, IK is held by elders due to their experiences in life. The study found that 100% of the respondent members of the community (60% females and 40% males) were in the age group of 45 and above. In IKS, elders play a central role in information management in traditional culture and are therefore seen as the “information storage and processing unit” of a society, just like the hard drive on a computer. They ensure continuity between the knowledge and values of their forefathers and the needs of younger generations preparing for life in the future. This was also testified by Hampâté Ba, a Malian philosopher, who argued that “In Africa, when an old person dies it is like when a library burns down.”

Recipients of Old Age Grants

Table No. 3

Male		Female	
30%	Recipients old age grants	40%	Recipients old age grants
10%	Non-recipients of old age grants	20%	Non-recipients of old age grants

The study also revealed that 70% of the respondents (40% females and 30% males) were receiving old age grant. An old age grant is a monthly income provided by the South African Social Security Agency to older people, and only paid out to people whose income is below a certain level. However, certain requirements have to be met for an older person to access the grant. The criteria include but are not limited to, being a South African citizen or permanent resident and aged 60 years and older. As indicated above, 70% of the respondents had already gone through the qualifying process, passed the means test and were accessing the old age grant. However, only 30% of the respondents (20% females and 10% males) were not

receiving old age grant simply because they were still employed and did not qualify for the grant.

Income of Respondents

Table No. 4

Male		Female	
30%	R0 – R2,000	40%	R0 – R2,000
10%	R2,500 – R5,000	20%	R2,500 – R5,000

The study was interested in finding out the monthly income of the respondents of which the findings revealed that 70% of the respondent members of the community (30% males and 40% females) had a monthly income of R0-R2, 000. This threshold was informed and determined by the amount of the old age grant from SASSA since the majority of respondents were elders and accessing the grant. However, only 30% of the respondent community members(20% females and 10% males) had a monthly income of R2, 500-R5, 000and were permanently employed. This income scale has been classified as below the minimum wage by the South African Department of Labour. It is referred to as the lowest hourly, daily or monthly wage that employers may legally pay employees or workers. It often applies to unskilled or semi-skilled workers in the service industry, in factories or in manufacturing plants. In South Africa, Minimum Wages are prescribed and determined per sector or area. As such, 30% of the respondents as mentioned above were being governed by the sectoral determination sets in terms of minimum wages, working hours, number of leave days and termination rules.

Gender of Respondents

Table No. 5

Male	Female
40%	60%

The study revealed that women had a high representation, (60%) because they were the main knowledge holders and custodians of IKS, and also because their life expectancy was higher than men who were given a small representation of (40%). Thus, IK is by its very nature gender sensitive (Warren, 1989). Gender differentiation comes about as a result of the specific experiences, knowledge and skills which women and men develop as they carry out the responsibilities assigned to them (Feldstein and Poats, 1988). In addition, the kinds of relationships which exist between these two sets of innovators affect hierarchies of access, use and control, resulting in different perceptions and priorities for the innovation and use of technology by women and men (Appleton, 1993). The degree of gender specificity attached to the IK depends not only on the way responsibilities are allocated but also on the degree of flexibility men and women (particularly women) have to carry out the work. Whilst such differences are clear, as Fairhead (1992) points out, it should not be assumed that knowledge is limited to areas within people have a role to ACCID: The African wide Civil Society Climate Change Initiative for Policy Dialogue play. However, the gender-based division of labour leads to the majority of women having a major role in attending to the daily needs of the household.

In addition to the above, the multi-faceted role played by grandmothers reflected in the number of literature references grandmothers' roles in non-western societies. In support of the statement (Aubel, 2005) revealed that grandmothers, in virtually all cultures and communities, have considerable knowledge and experience related to all aspects of maternal and child development, and that they have a strong commitment to promoting the well-being of children, their mothers, and families. Societies around the world acknowledge that grandmothers play an influential role in the socialization, acculturation, and care of children as they grow and develop and in the education and supervision of their daughters and daughters-in-law.

Place of Birth of Respondents

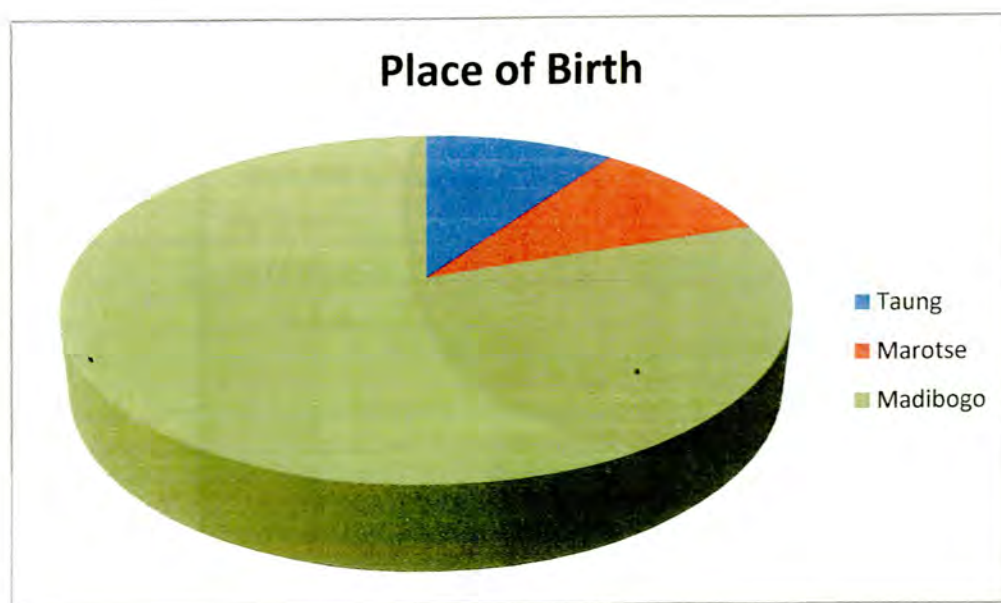
Table No. 6

Male		Female	
30%	Madibogo	50%	Madibogo
10%	Taung	10%	Marotse

The study was further interested in finding out the place of birth of the respondents and the years they had lived in Madibogo in order to determine the experience, authenticity and knowledge of the area. The findings revealed that 80% of respondents (50% females and 30% males) were born in Madibogo, which guaranteed authenticity on the knowledge and experience they possessed on IKS in the area, particularly women since they constituted the highest variable of 50%. Furthermore, according to IKS women have a life expectancy that is higher than men and are regarded as the main holders of IKS. Since, indigenous knowledge relates to a particular people, it is also specific in both time and space, and it is often associated with the original inhabitants of a particular geographic location who have a distinct culture and belief system. The original inhabitants constituted 80% respondents (50% females and 30% males) and it symbolised that they were indigenous to the area. However, 20% of respondents (10% female and 10% male) migrated from Marotse and Taung respectively, though they have lived for more than 30 years in the area. The period they had stayed in the area was long enough for them to be classified as indigenous to the area as well.

Table No. 7

The chart below indicates the percentage level of respondents who were born in and out of Madibogo.



This pie chart shows that 80% of the respondent members (50% females and 30% males) were born in Madibogo. However, 20% respondent community members were born outside of Madibogo (10% female in Marotse village and 10% male in Taung village).

Years lived in Madibogo

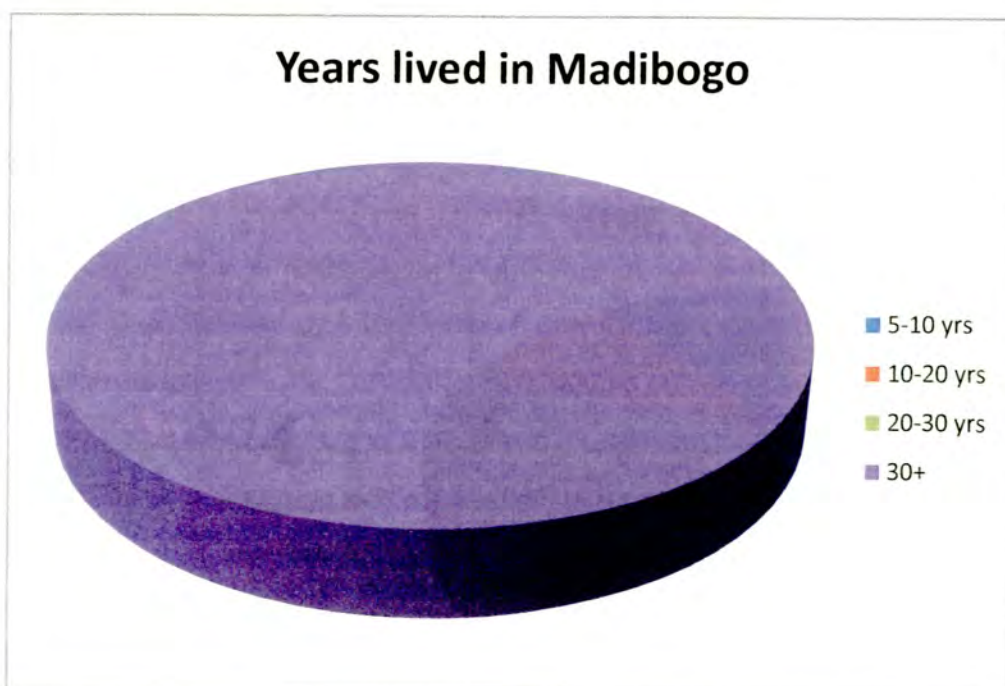
Table No. 8

Male		Female	
40%	30+ yrs	60%	30+ yrs

100% of the members of the community (60% females and 40% males) lived for more than 30 years in Madibogo, which qualified their experience and knowledge of the area as authentic.

The table below shows the number of years that respondents stayed at the research area

Table No. 9

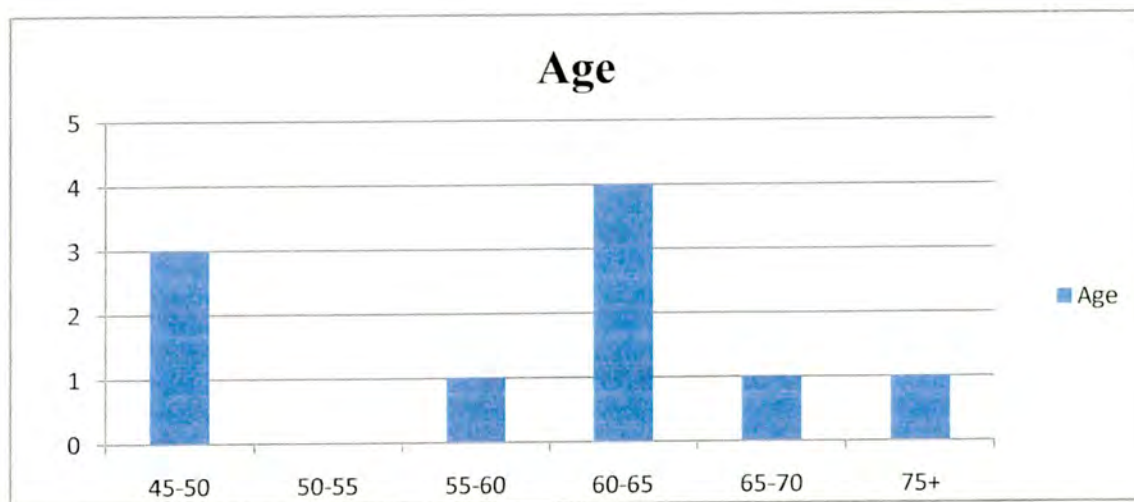


This pie chart shows that 100% of the respondents' community members (60% females and 40% ma

years in Madibogo. Undoubtedly, this qualified their experiences and knowledge of the area as authentic.

The study revealed that 100% respondents (60% females and 40% males) were in the age group of 45 and above

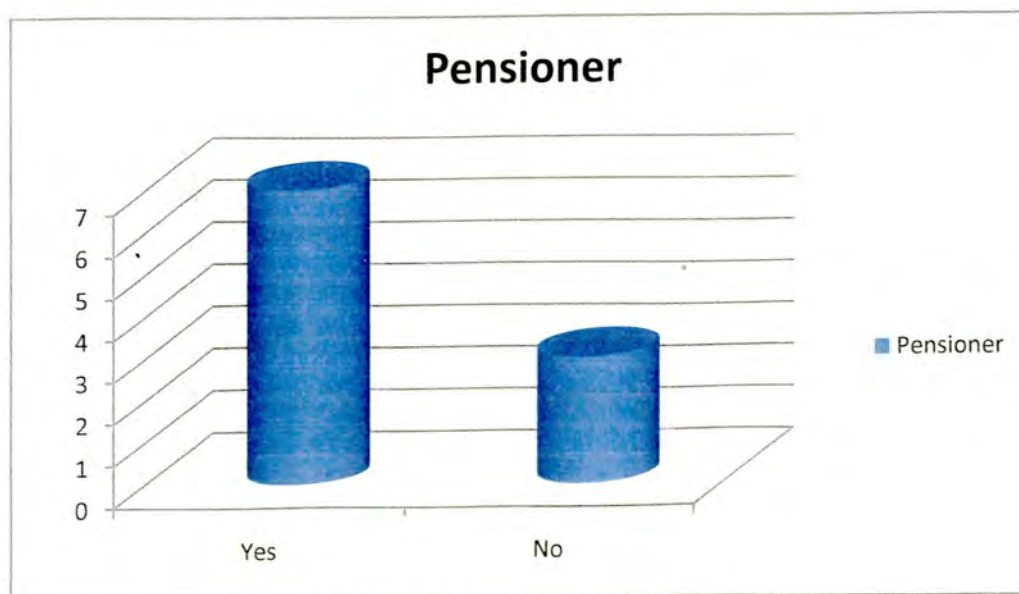
Table No. 10



4.3.1.2 Recipient of old age grant

Table No. 11

The graph below indicates the level of percentage of respondents who receive pension grants.

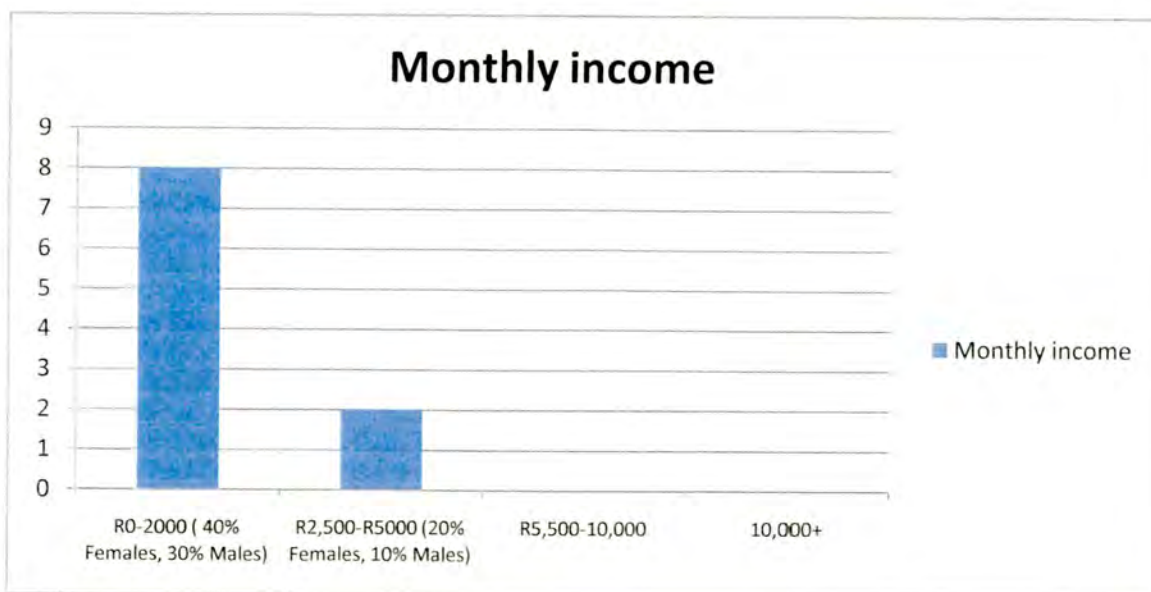


This chart revealed that 70% respondents (40% females and 30% males) were receiving old age grant. However, 30% of the respondent members (20% females and 10% males) were still working and not yet qualified to receive old age grant. This shows that the majority of respondents are elders who depend on the state for livelihoods.

4.3.1.3 Monthly income

Table No. 12

The table below indicates the percentage level income generated or received by respondents from the community.



The findings revealed that 70% of the respondent community members (30% males and 40% females) had a monthly income of R0-R2, 000. However, 30% of them (20% females and 10% males) had a monthly income of R2, 500-R5, 000. These are members of the community who are actively involved in economic activities or self-employed. It shows that not much income is generated by the community.

4.5 Perception of Respondents on Climate Change

4.5.1 (a) The principle of Ubuntu/ Botho

The participants were asked during the interview to indicate what they thought were the factors contributing to climate change and led to developmental challenges in their area.

The study revealed that changes in lifestyles, ignorance and undermining indigenous knowledge systems were believed to be the main factors contributing to climate change. It was revealed that in the olden days communities were guided by the principle of 'Ubuntu, observed traditional norms, values and practices. According to the respondents 'Ubuntu principle was reflected through having African morals which included living harmoniously with others. Honouring communal relationships, sharing responsibilities, wealth and resources within the community. Respecting and reviving the wisdom of elders, giving consideration to the living, the dead and the future generations. Embracing spiritual values, traditions, and practices reflecting connections to a higher order and culture. All these values were claimed to have disappeared in today's lifestyle in which everyone minded his or her own businesses and let people work in silos towards fighting the battle against climate change.

'Ubuntu is an Nguni Bantu term roughly translating to "human kindness". From the Bantu language, the interconnectedness concept of 'Ubuntu is "everyone is part of the whole." The philosophy of "I am because of who we all are" is an awareness to Africans that we are all part of something larger. The principle of 'Ubuntu in the African lifestyle gives testimony that Africans ensure benefit to the majority over and above the individuals.

In the book the *Culture Smart! South Africa* by David Holt-Biddle cited by (Brinn, April 2, 2013 online), 'Ubuntu is stated as an ageless African concept standing for kindness toward other human beings, caring, sharing and being in harmony with all. Former President Nelson Mandela once gave a third of his salary to the Nelson Mandela Children's Fund that¹ he had established to help underprivileged children providing a great example of 'Ubuntu. ²Another example of 'Ubuntu is how one person in a family or group will willingly support all the others. They say this is a very "African" thing – wouldn't it be a better world if it became a "Global" thing. If inspired by this concept; maybe our future global leaders can adopt the spirit of 'Ubuntu
(Jan Brinn , http://msue.anr.msu.edu/news/ubuntu_a_south_african_philosophy_that_can_inspire_youth)



¹Ubuntu – a Nguni Bantu term translating to human kindness

²muti – African herbs

³Lehetlho – indigenous game used to trigger the rain to fall

Furthermore Michael Onyebuchi Eze ([http://en.wikipedia.org/wiki/Ubuntu_\(philosophy\)](http://en.wikipedia.org/wiki/Ubuntu_(philosophy))) argued that the core of 'ubuntu' can best be summarized as follows: "A person is a person through other people strikes an affirmation of one's humanity through recognition of an 'other' in his or her uniqueness and difference. Humanity is a quality we owe to each other. We need to sustain this otherness creation.

4.5.1 (b) Rain-making rituals

Some of the cultural practices that the respondents believed to have prevented climate change from happening included but are not limited to; traditional healers throwing bones, burning muti and traditional herbs at the tribal kraal and calling upon their ancestors to release the rain. This was reported to have worked and assisted farmers in pursuing their farming activities, thereby reducing the high level of poverty and lack of food security that was being experienced by the community.

4.5.1 (c) Lehetlho

Young girls used to play *Lehetlho*, which was one of the indigenous games which were believed to have the power to trigger the rain. The game was played by two groups of young girls from different villages whereby the group which from another village would go to the chief's house and ask for water pretending to be thirsty. After being innocently given the water, they would not return the cup or glass they were drinking water from and run away with it, passing it from one member of her group who will be standing at the front until they reach their village so as to hide it at their chief's kraal. The group from the village where the glass, cup or *lehetlho* was taken would run after those girls with the intention to take the *lehetlho* back to their chief's house. The respondents reported that once the *lehetlho* was returned to the chief's house, the rain would immediately fall. They also believed that these traditional games had a positive contribution to the rain and climate change was not being experienced as it was the case with the current environmental problems.

4.5.1 (d) Bogwera / Bojale

⁴³*Bogwera / Bojale* was being respected and held during specific winter months for a particular age group of people at the forest far away from people's reach or visibility. The intention of the

⁴*Bogwera/ Bojale – initiation school*

initiation school was to put young boys under training in which they qualified from being boys to being men. They were taught how to become responsible husbands to their wives and ⁴children, traditional customs and laws, their family trees, their ancestors, survival skills and the history of their families so as to know who they are or where they come from. The respondents stated that the meaning and purpose of these initiation schools has been distorted and used for self-enrichment by those who were not qualified to be *Rathipana*. The findings revealed that some of these modifications which interfered with cultural practices were seen as factors influencing climate change.

5

4.5.1 (e) Botlholagadi

The study also revealed that today climate change is happening because *batlholagadi* were no longer respecting the cultural rules and regulations set for mourning their deceased husbands. Widows were not allowed to travel in the village at 12H00 midday; this was a taboo which was believed can stop the rain. If you visited somewhere and it happen that 12h00 midday pass while away from home, you were expected to stay there and wait to go back home in the afternoon when the sun was no longer strong.

They were also expected to wear *role* (special designed black clothes) for 12 months as a sign of mourning for their husband and were not expected to wash it during the day, but only at night for it not to be seen by the people. The widows were given herbals immediately the husband is declared dead with the purpose of cleaning her blood so as not to affect men with diseases such as *tlhogo e tonna or sebetse se sesweu*).

Widows were expected to sit on a mattress in the main bedroom and not go to the living area with other people who came to comfort her and not to leave the yard. It was only after the burial of the husband that the widow can be cleansed (*horolwa*) with herbals such as (*dithotse tsalephutse, letlhoka la tsela, mosiama and thuge*) so that she can attend to errands that she wants to do. 6 months after the husband's burial the widow was sent to her maternal family for another cleansing at 3h00 in the morning and the clothes that she wore when she came were to be burnt and she was to be provided with new clothes, get her hair cut in front of the front door

⁴ Bogwera/ Bojale – initiation school

⁵ Rathipana – a ceaserian at the initiation school

⁶ Batlholagadi – widows

⁷ tlhogo e tona or sebetse se sesweu – African herb

facing the direction where the sunrise (East). This cleansing was done with a mixture of herbals and (¹⁰*moshwang wanku*), and⁶she was to return home to her in-laws without entering the house or sleeping over or even eating food from her maternal family home. It was only after these traditional processes that the widow was allowed or permitted to walk free, without interrupting or stopping the rain from falling. However, the respondents felt that if all these cultural practices were still being practiced, climate change would not have happened and people could still be practicing subsistence farming and sustaining their families.

4.5.1 (f) Cleansing

The other thing that was stated as perpetuating climate change and disturbed the rain pattern was lack of cleansing at accident scenes. This was believed to have a negative impact and disturbed the rain from falling; if not done, it caused bad luck for people passing on that spot, accidents would keep on happening on that area or a person who died on that spot was believed not to rest in peace and keep on appearing on the road in the form of a ghost to scare people so that they would lose control of the car and cause another accidents

4.5.2 Rural People and Subsistence Farming

The study wanted to find out why the rural people no longer practice and depend on subsistence farming as a primary economic activity. It was revealed that the weather conditions were no longer conducive for farming due to; excessive hot and cold weather conditions, minimal rain, theft of stock and equipment, expensive farming implements as a result of the introduction of machinery by the westerns, which undermined indigenous knowledge and practices. For example, indigenous people were using the ox-plough which was handmade and cost effective. It was also mentioned that a Euro-centric lifestyle made the ancestors angry hence the change in climate leading to extreme poverty.

The respondents were asked whether the seasons of the year assist farmers in determining the right times for implementing and monitoring farming activities and processes.

The study revealed that seasons of the year have drastically changed and no longer add value or

⁸Go horolwa—to be cleansed

⁹dithotse tsalephutse, letlhoka la tsela, mosiama and thuge – African herbs

¹⁰moshwang wanku – fresh waste from the stomach of a slaughtered sheep

assist farmers in determining the right times to implement and monitor farming activities and processes as they used to, due to changed and excessive weather conditions that are being experienced. The study found the farming process used to be practiced as follows; August was meant for preparing the soil;

September was the month for planting seedlings after receiving the first annual rain that came immediately after harvesting which was called *"kgogolammoko"*.

October was the month for cleaning and cutting weeds,

December was meant for allowing plants time to grow so as to be ready in

January for first fruits.

June and July were meant for harvesting.

These recent changes in seasons were claimed to have been there in the past, but not as excessive as today. The old seasons used to play a significant guiding role in assisting farmers in the implementation and monitoring of farming processes and activities. However, it was claimed that the current change in seasons were no longer assisting farmers. Instead, they worked at a loss with no return on investment, due to the inconsistency of the weather and its excessive conditions. ⁷



¹¹*kgogolammoko – the first rain after harvesting*



The decline in farming activities led to the closing down of agricultural facilities which left a large number of community members unemployed

4.5.2 The effects of climate change on the community of Madibogo village

The researcher wanted to find out how climate change affected the lives of the respondents and the community. The study found that the respondents' community was experiencing unusual diseases, migration of people from rural to urban areas in search of job opportunities and developments. Drought and veldt fires which led to a decline in grazing pastures and livestock, extinction of indigenous plants, premature deaths, water scarcity and dried-up fountains that used to supply the community members with water and lack of developments. The respondents believed that Traditional healers are mostly affected by extinction of species and plants in the area since it leads to a shortage of herbs for traditional medicine (*muti*). Hence their businesses remain threatened and unsustainable.

The study further revealed that deforestation led to serious environmental degradation as the community cut trees for firewood and heating purposes during funerals, cultural functions, and weddings and some still use wood for household purposes.

The study also revealed that the introduction of technology and electricity in particular, changed and manipulated the mindset of Africans to undermine the Afro-centric and embrace the Euro-centric lifestyles. For example, the study found that youngsters no longer wanted to be associated with smoke from firewood, stems from dried maize and cow dung for heating, and instead preferred electricity because they claimed smoke has a bad odour which was not good for their health and is also outdated.

The findings also revealed that farmers were adversely affected by climate change to an extent that some had totally stopped livestock and crop farming activities. Others were left with only a few manageable livestock, while others claimed that their lives had been affected as they were no longer producing what they could sustain their families with, by slaughtering their own livestock, but they were now forced to buy meat from the butchery. The findings also discovered that people were highly dependent on government grants since there were no job opportunities due to decline in farming activities.

It was also revealed that the respondents were experiencing water scarcity due to the drying –up of water wells, water fountains by the rivers, and they claimed that community taps and dams that were filled through windmills had dried up. The respondents claimed that they were buying water from those with bore holes or alternatively relied on the truck water supply from the municipality, which was also reported not to be reliable on its delivery days.



Dried water well led to buying water from those who have boreholes. Or depending on the municipal water truck supply which is not enough too.



Community members used to draw water from the water well before experiencing Climate Change problems.



This dam used to store and supply the community with water generated through the windmill



The municipal truck supplying the community of Madibogo with water for consumption and household usage

4.5.3 Factors influencing migration from rural to urban areas

The study was interested in finding out the factors that influenced people to migrate from rural to urban areas. The findings revealed that people were migrating in large numbers from rural to urban areas to seek for job opportunities as there were no factories or firms in the rural areas.

The lack of development was also mentioned as another reason that influenced migration to urban areas, especially amongst the youth because they wanted to stay in developed areas because of better schools, institutions of higher learning for furthering studies, good infrastructure, tarred roads etc, as compared to where they were coming from. It was reported that developments took time to reach rural people because their voices are not being heard by the municipality. Lack of community consultation on developments and prioritization of community needs were issues of concern to the respondents e.g. the municipality had prioritized and built community halls which were claimed to have brought no impact into the lives of the people, over and above the provision of water.

Marriage was also reported as having an influence on urban migration. It was worth noting that in many instances youngsters migrated to urban areas simply because they wanted to be independent and this led to ill-discipline e.g. cohabitation, owning shacks at informal settlements, prostitution, starting families that had not been approved by parents, and having children out of wedlock.

4.5.4 Factors leading to delay in bringing developments in rural areas

The study wanted to find out factors leading to delay in bringing developments in rural areas and the findings revealed that the following factors propagated the delay:

- Minimal cooperation or collaboration between ¹³Dikgosi and the municipality⁸;
- Lack of community consultation on the municipal Independent Development Plan (IDP)

¹³Dikgosi – chiefs

- and non-prioritization of community needs;
- Imposed and pre-determined developments aimed at self-enrichment and pushing individual agendas;
- Delay in responding to community needs;
- Rural communities were afraid to protest if they are dissatisfied and do not know their Constitutional Rights;
- Education level and inability to understand issues amongst *Dikgosi* at times obstructs developments;
- The hereditary nature of the chieftaincy which at times leads to questionable leadership and
- Inability to invest in the young people, either through training or provision of skills by the municipality;

4.5.5 Respondents' contribution towards climate change adaptation and mitigation at local level?

The respondents were asked whether their indigenous knowledge was been taken into consideration towards climate change adaptation and mitigation strategies at local level. The findings revealed that a majority of 60% females and 40% males reported that Indigenous Knowledge was not being recognized by the municipality and they were never engaged or given the opportunity to air their voices on the matter.

The following contributions were highlighted by the respondent community members for consideration by Ratlou Local Municipality towards climate change mitigation and adaptation strategies at Madibogo;

- To prioritize the provision of training on agricultural and farming activities and create jobs for the young people
- To introduce the ¹⁴*Namola Leuba* projects whereby farmers enter into a 5 year contract with government and are provided with farming implements, fertilizers, seedlings, irrigation systems, fencing of individual farmer's camps, and only expected to re-pay the loan after 5 years, after which the farm should be sustainable. It was reported that this method was previously implemented by the former Bophuthatswana government and proved to be productive and effective.

- Revitalization of existing neglected boreholes that are in the farming field and created during the Bophuthatswana government.⁹
- Digging of dams for animal water supply as was previously done by the community through ¹⁵*Letsema* activities
- Funding of community projects through provision of seedlings for backyard gardens in response to food security.
- Community awareness campaigns on the importance of farming and food security
- ¹³*Dikgosi* to bring into effect and re-enforce cultural activities, such as gathering traditional healers to pray for the rain, young girls to play ³*lehetlho*, ¹⁵*letsema*, cleansing rituals at accident scenes, reinforce rules and regulations for mourning the deceased partners, respect ⁴*mophato/koma*., If these are not implemented, there would be no return on investment even if the municipality could provide assistance to farmers.

4.5.6 The physical and photographic evidence on the landscapes as causes of climate change in Madibogo.

The respondents were asked as to whether the current physical landscapes of Madibogo was the same as in the past or had changed, and to provide photographic evidence in support of their responses.

It was revealed that the landscapes of the area had drastically changed. The vegetation was no longer green and attractive like before due to lack of or only minimal rain which equated to drought. Evidence revealed that the quality of soil was no longer fertile for farming and there was a decline in grazing land for animals. People were missing wild fruits like ¹⁶*moretlwa/ditlhekù*, *sethwanje*, *kgangale*, *motoro*, *mamothinthinyane*, *mochane*, *boreku*,¹⁰ *mokgorokgoro*, *mokofi*, *dinakaladi*, *sekgalo* and ¹⁷*thepe*, as they were no longer available. The consequences of the disappearance of indigenous wild fruits included drought, flooding, erosion, loss of soil

¹⁴ *Namola Leuba – Poverty Relief Projects*

¹⁵ *Letsema activities – Community activities done through contribution of labour or material for the benefit of an individual or group of people without getting paid for*

nutrients, loss of genetic diversity, and in many cases led to the total loss of indigenous knowledge since this is largely oral, passed on through the generations by women and men who had the trust of the elders or the community.¹¹



Unattractive and changed landscapes showing poor and scattered vegetation with poor soil quality.

4.6 Conclusion

This chapter presented the findings revealed from the respondents through interviews and questionnaires. It was revealed that IK is held by elders due to their experiences in life and they play a vital role in information management in traditional culture. The findings revealed that little income is generated in the study community. The findings also discovered that people were highly dependent on government grants since there were no job opportunities due to the decline

³Lehetlho – indigenous game used to trigger the rain to fall

⁴Mophato/koma – initiation school

¹³Dikgosi – The Chiefs¹¹

¹⁵Letsema - community activities done through contribution of labour or material for the benefit of an individual or group of people without getting paid for

¹⁶moretlwa/ ditllieku, sethwanyane, kgangale, motoro, mamothinthinyane, mochane, boreku – wild fruits

¹⁷Thepe – wild vegetable

in farming activities. Moreover, IK is by its very nature gender sensitive. As such gender differentiation came about as a result of the specific experiences, knowledge and skills which women and men develop as they carry out the responsibilities assigned to them.

Furthermore, the study revealed that changes in lifestyles, ignorance and undermining of indigenous knowledge systems, as well as not observing the principle of *ubuntu* were found to be the main factors contributing to climate change.

The study also revealed that the introduction of technology and electricity in particular, changed and manipulated the mindset of Africans to undermine the Afro-centric and embrace the Euro-centric lifestyles. For example, the study found that youngsters no longer wanted to be associated with smoke from firewood, stems from dried maize and cow dung for heating, and instead preferred electricity because they claimed smoke has a bad odour which was not good for their health and also outdated

The lack of development was also mentioned as another reason that influenced migration to urban areas, especially amongst the youth because they wanted to stay in developed areas, for better schools, institutions of higher learning for furthering studies, good infrastructure, tarred roads etc as compared to where they were coming from. It was reported that developments took time to reach rural people because their voices are not being heard by the municipality. Lack of community consultation on developments and prioritization of community needs were issues of concern to the respondents e.g. the municipality had prioritized and built community halls which were claimed to have brought no impact into the lives of the people, over and above the provision of water.

CHAPTER 5

RECOMMENDATIONS AND CONCLUSIONS

5.0 INTRODUCTION

Chapter five is the final chapter of this research report. In this chapter the researcher develops recommendations and guidelines out of the research process to guide the integration of indigenous knowledge into the local development climate change policy strategies in Ratlou Local Municipality. In drawing these recommendations out of the research the researcher drew on all the experiences, knowledge and insights gained throughout the entire research process.

5.1 Recommendations for the integration of indigenous knowledge systems into Local Development Climate Change Policy strategies

The present patterns of development approach a dead-end, as the great majority of societies reach points of non-sustainability in their basic economic processes and conditions. In order to avoid this happening, the following recommendations are hereby brought forward;

- **Community consultation through public participation should be considered as an integral component of sustainable development.** Thus, government should not impose developmental projects but rather consult with the community and solicit inputs on prioritization of their needs. Failure to include community consultation would lead to prioritizing things that do not bring an impact to the lives of the community such as building a community hall over and above the provision of water to the community.

- **The youth must be given a platform to raise issues affecting their developments.** Lack of developmental platforms influence migration to urban areas, especially amongst the youth because they want to stay in developed areas for better schools, institutions of higher learning for furthering studies, good infrastructure, tarred roads etc, as compared to where they are coming from. The study revealed that developments take time to reach rural people because their voices are not being heard.
- **The study revealed that developments takes time to reach rural people because their voices are not being heard.**
- **There has to be improved working relations and cooperation between the municipality and the house of traditional leaders or the paramount chief.** In an effort to find new and adequate patterns of development, it is necessary to consider the structural constraints within which contemporary societies find themselves and search for realistic alternatives to eliminate them. This will automatically define the role of IKS and give serious attention to its role when designing strategies or implementing development projects. Thus, the institutions, values, norms, traditions, expressions and attitudes of a society should be taken into account.
- **Culture should continue to play a significant role in order to achieve the socio-economic development.** Thus, culture and development should always be incorporated if sustainable development has to be achieved. Culture should no longer be viewed as a set of artistic activities enjoyed by a select few; and development in turn, should no longer be conceived as a linear process of wealth accumulation through industrialization and infrastructure creation measured by indicators such as the GDP, per capita income, and life expectancy.

- **Leadership through education, and participatory democracy in decision-making.** Leadership means making constructive suggestions, and working with people to show by actions what it is that you are urging them to do by being part of them and recognizing your equality with them. Finally, if local government wants to contribute positively towards the development of rural areas, it needs to ensure that rural communities undertake their own development by way of involving them through education and leadership. It is through this means that people can be helped to understand both their needs, and the things which they can do to satisfy these needs. This is the only way that developments can be brought to rural areas. As a result, over and above the prevailing leadership, the decisions must come from the people themselves, and they themselves must carry out the programmes they have decided upon.

In conclusion, the recommendations of the study came to a clear understanding that issues of IKS need to be taken into consideration. Moreover, there is a need for further research to ensure that policy matters do include IKS. Other studies on climate change mitigating factors should also be taken into consideration. Finally, it should be noted that the North West Province is faced by serious droughts and that the repercussions are to be controlled by human beings. This can only be achieved through collective efforts and decision-making by many stakeholders such as government, the community and the private sector.

ANNEXURE A

Research Questionnaire

LOCAL DEVELOPMENT, ITS MITIGATION AND ADAPTATION STRATEGIES ON CLIMATE CHANGE

A case study of Madibogo village

LEMORAGO LA MMOTSWA DIPOTSO

(Dira letshwao la sefapano mo bokosong ya karabo e e maleba)

DINGWAGA : 45 – 50 50 – 55 55 – 60 60 – 65 65 – 70 75+

MOAMOGEDI WA MADI A BOTSOFE : Ee Nyaa

LETSENO KA KGWEDI:

0 – 2,000 2,500 – 5,000 5,500 – 10,000 10, 000 +

BONG:

MONNA MOSADI

LEFELO LA TSALO: _____

DINGWAGA O LE MOAGI WA MADIBOGO:

5-10 yrs 10 - 20 yrs 20 – 30 yrs 30 + yrs

1. "Botshelo jwa gompieno bo fetogile ebile ga bo sa tshwana le jwa maloba", a o dumalana le seno?

Ee ☐ Nyaa ☐

1.1 Go tlaleletsa mo karabong ya gago e e fa godimo, re anaanele ka boripana kitso le maitemogelo a gago ka mokgwa o batho ba neng ba tshela ka teng mo malobeng o o farologaneng le wa gompieno.

1.2 Seemo sa bohuma se ne se le kwa tlase mo malobeng ga o tshwantshanya le gompieno gonne batho ba ne ba itlamela ka temo le leruo gore ba kgone go tlamela ba malapa, masika, le baagisane. Seno se ne se tlotlhelediwa ke eng?

Botho ☐ Go tlhoka thuto e kgolwane ☐ Maemo a loapi a a siametseng temo ☐

1.3 Ke ka ntlha ya eng batho ba mo metse-selegaeng ba sa tihole ba iphidisa ka temo le leruo jaaka mo malobeng?

2. Ngwaga o na le dipaka di le nne (selemo, mariga, tllhabula le dikgakologo) tse di neng di na le bokao ebile di thusa balemi go itse nako e e maleba ya go lema. Go ya ka maitemogelo a gago, a dipaka tseno di santse di na le boleng mo baleming le baruakgomo?

Ee Nyaa

2.1 Neelana ka tlhaloso ya karabo ya gago e mo 1.4

2.2 Diphetogo tsa maemo a loapi kana tsa dipaka tsa ngwaga di tllholwa ke eng?

- (a) Mogote o o feteletseng
- (b) Serame se se feteletseng
- (c) Diphefo tse di feteletseng
- (d) Ga ke tlhaloganye gore di tllholwa ke eng

2.3 Diphetogo tsa maemo a loapi le botshelo ka kakaretso tsa ga jaana di amile matshelo a baagi ba Madibogo jang?

-
-
3. Baagi ba dirisa kitso ya bone ya setso/ setswana go le kana ka eng goleka go ka efoga maemo a ga jaana a botshelo ka kakaretso mo Madibogo?
-
-
-
-
-
-
-

3.1 A masepala o tsaya tsie dikgakololo tsa baagi ka kitso ya bone ya setso /setswana mo go rarabololeng mathata le go tlisa ditlhabololo mo Madibogo?

- (a) Ee
- (b) Nyaa
- (c) Ka dinako dingwe
- (d) Ga ke itse masepala

4. Gantsi batho ba mo metse-selegaeng ba kgaola ditlhare ko nageng go di dirisa jaaka dikgong go gotetsa le go gotsa mollo go apaya dijo mo matlong le ko dintshong. Seno gantsi se feleletsa se tlisa kwelotlase ya tikologo le go fedisa ditlhare tse gantsi di dirisiwang ke dingaka tsa setso go dira mesunkwane. Go ya ka maitemogelo a gago, a seno se ama dikgwebo tsa dingaka tsa setso?

- (a) Se ba ama thata
- (b) Se a ba ama
- (c) Ga se ba ame
- (d) Ga se ba ame thata

- 4.1 Mo malobeng batho ba ne ba dirisa ditlhotlha le dibe go ka gotetsa le go apaya, mme ga jaana tiriso ya dilo tseno e wetse tlase. O nagana go re ke ka ntlha ya eng baagi ba sa tlhole ba di dirisa kgotsa tiriso ya tsone e wetse tlase?
-
-

5. Seemo sa bohuma se se etegelang ga jaana mo Madibogo se ka tswa se tlholwa ke eng?

- (a) Maemo a loapi a a sa nametsegang go ka lema mo go ona le go rua
- (b) Botlhoka tiro
- (c) Merwalela
- (d) Komelelo e e feteletseng

5.1 Batho ba bantsi ba mo metse selegaeng ba dira ko metse setoropong. Go ya ka maitemogelo a gago seno se ka bo se tlhotlhelediwa ke eng?

5.2 Metse-setoropo e na le ditshono tse dintsi tsa ditiro le di tlabololo, tseno ke dingwe tsa dilo tse di tlhotlheletsang batho ba mo magaeng go ya go senka ditiro kwa ditropong le metse-setoropong. A o dumalana le se?

Ke a dumelana ☐ Ke dumelana gotlhe-gotlhe ☐ Ga ke dumelane ☐

Ga ke dumelane gotlhe-gotlhe ☐

5.3 Neelana ka mabaka a mangwe a o naganang gore a ka tswa a tlhotlheletsa batho ba mo magaeng go ya go nna kwa ditropong le metse-setoropong ntle le go ya go senka ditiro?

5.4 Ditlhabololo di dintsi ebile dia bonagala kwa metse-setoropong ga go tshwantshiwa le mo metse-selegaeng. A o dumalana le se?

Ke a dumelana ☐ Ke dumelana gotlhe-gotlhe ☐ Ga ke dumelane ☐
Ga ke dumelane gotlhe-gotlhe ☐

5.5 Gantsi ditlhabololo di tsaya nako e telele go fitlhelela metse-selegae, go ya ka maitemogelo a gago seno se ka bo se tlotlhedediwa ke eng?

6. Go ya ka wena a ditebego tsa ga jaana tsa tikologo go akaretsa (mmu, dithaba, phulo le tse dingwe) di sa ntse di lebega jaaka mo malobeng?
- (a) Ee (b) Nyaa

6.1 Neelana ka tihaloso ya karabo ya gago mo (6)

6.2 Neelana ka bopaki jwa ditshwantsho tsa mo malobeng le tsa ga jaana go bontsha pharologanyo e le sesupo se se tlamelang dikarabo tsa gago mo (6 & 6.1)

6.3 Maemo a phulo a wetse tlase mo Madibogo, seno se amile jaang baruakgomo?

- (a) Bangwe ba tlogetse go rua
- (b) Bangwe ba setse ka leruo le le kwa tlase
- (c) Maemo a bona a botshelo a wetse tlase gonne ga ba sa tihole ban a le se ba iphedisang ka sone
- (d) Ba tshwanelwa ke go reka nama ko mabenkeleng a a rekisang nama jaaka batho botlhe

7. Ke eng se se neng se tswela baagi mosola mo tikologong ya bona, seo ba se tihokang le go se gopola ga jaana mo tlase ga maemo a tikologo a ba iphitlhelang ba le mo go ona?

- (a) Maungo a naga
- (b) Merogo e e neng e lemiwa
- (c) Botala jwa naga
- (d) Didiba le metswedi ya metsi e e neng e ba thusa gore ba se reke le go ikepela metsi

8. Temo e ne e tshameka karolo e tona thata mo letsenong la malapa mo malobeng. Ga jaana temo e wetse tlase kgotsa e fedile gotlhelele, o ka tihalosa gore letseno la ga jaana la baagi le itshetlegile ka eng / le tswa kae?

9. Neelana ka ditshitsinyo go lefapha la memero ya tsa selegae mo go lweng ntwaga katlhanong le diphetogo tsa matshelo le tikologo tse di itemogelwang ke baagi ba Madibogo.

BOKHUTLO

RE LEBOGELA MATSAPA LE NAKO YA GAGO E O RE FILENG YONA!!!

REFERENCES

- Africa Partnership Forum, 2007. 8th meeting of the African Partnership Forum, Berlin, Germany.
- Brinn, J. 2013. *Ubuntu: A South African Philosophy that can inspire Youth*, Michingan State University
- Carlson, A. 2010. *Women Know More About Climate Change, Men Think They Do*, tags: "climate change gender, climate change opinion", University of California.
- Chikulu, B.C 2011, *Paper prepared for the CLG Research Colloquium on Sustainable Local Governance for Prosperous Communities, Commonwealth Local Government Conference on Energising Local Economies: Partnerships for Prosperous Communities 13-18 March, 2011, City Hall, Cardiff UK.*
- Climate Change and International Security*, 2008. Paper from the High Representative and the European Commission to the European Council.
- David Parry-Davies ~ Article on Sustainable Development, Eco-Logic Publishing Sustainable Development (23/08/2013 online)
- Davidson, O. 2001. *Climate Change and Development and Energy: Future perspectives for South Africa*, Energy and Development Centre, University of Cape Town.
- Dawson, C. 2002. *Practical Research Methods*, New Delhi, UBS Publishers' Distributors.
- Dei, Hall, and Goldin Rosenberg, 2008, *Indigeneous Knowledges in Global Contexts*, Canada, Canadian Cataloguing in Publication Data
- Dixon, R. 2008. *Africa most vulnerable to effects of global warming*, United Nations Environment Programme report.
- First Climate Change and Development in Africa (CCDA-I) Conference, 2011. African Climate Policy Centre.
- Human Development Draft Report, 2007. *Climate change and Human Development in Africa: Assessing the Risk and Vulnerability of climate Change in Kenya, Malawi and Ethiopia*, IGAD Climate Prediction and Applications Centre.
- http://en.wikipedia.org/wiki/Effects_of_global_warming.
- <http://www.africaclimatesolution.org>
- http://psychology.about.com/od/qindex/g/quant_data.htm
- http://en.wikipedia.org/wiki/Effects_of_global_warming

- http://en.wikipedia.org/wiki/Global_warming_controversy
- <http://www.slideshare.net/ecumene/14-development-definitions-and-measuring-development>
- http://en.wikipedia.org/wiki/Global_warming_controversy
- http://en.citizendium.org/wiki/Indigenous_knowledge
- <http://ajslp.asha.org/cgi/content/full/20/4/261>
- Indigenous Knowledge Systems Policy, 2004. Department of Science and Technology, Republic of South Africa, Pretoria.
- Intergovernmental Panel on Climate Change, 2007. Fourth Assessment Report.
- Kendra Cherry. (2013 online) About.com Guide What Is Quantitative Data?
- Kincheloe S, 2011, What is Indigenous Knowledge? Routledge, New York
- Kothari, C.R. 1985. *Research Methodology- Methods and Techniques*, New Delhi, Wiley Eastern Limited.
- Kumar, Ranjit. 2005. *Research Methodology-A Step-by-Step Guide for Beginners*, (2nd.ed.), Singapore, Pearson Education.
- Laszlo E and Vitanyi I, 1985, European Culture and World Development; UNESCO joint Studies for the European Cultural Forum, Pergamon Press, Europe
- Macchi, M. 2008. *Indigenous and Traditional Peoples and Climate Change*, IUCN Issues paper.
- McDonald, M. 2010. *Climate Change Impacts on the Achievement of the Millennium Development Goals: Can we afford not to integrate?* Realizing Rights, GCAP and GCCA.
- Mazonde I.N & Thomas P, 2007, Indigenous Knowledge Systems and Intellectual Property in the Twenty-First Century: Perspectives from Southern Africa, Council for the Development of Social Science Research in Africa, Senegal
- National Climate Change Response Strategy for South Africa*, 2004 Department of Environmental Affairs and Tourism, Pretoria.
- Neelin, J.D. 2011. *Climate Change and Climate Modeling*, Cambridge University Press, New York
- Neil Kokemuller, eHow (2013). What Is Quantitative Research? http://www.ehow.com/info_10018889_quantitative-research.html
- North West Provincial Growth and Development Strategy, 2004-2014.
- Nyong, A. et al. 2007. *The value of Indigenous Knowledge in Climate Change Mitigation and Adaptation strategies in the African Sahel*, Springer Science + Business Media B.V
- O'Brien, St. Clair and Kristoffersen. 2012. *Climate Change, Ethics and Human Security*, Cambridge University Press, New Work
- Policy Brief, 2007. *Organization for Economic Co-operation and Development*.

Progress Report on Climate Change and Development, 2009, *meeting of the Commission of Experts of the 2nd Joint Annual meetings of the AU Conference of Ministers of Economy and Finance and ECA Conference of Ministers of Finance, Planning and Economic Development*, Cairo, Egypt.

Rubin & Babbie, 1993, http://www.uncp.edu/home/marson/qualitative_research.html

Serote (2001, online <http://osarome.blogspot.com/2011/12/write-on-value-of-indigenous-knowledge.html>)

Smit A.J & Masoga M, 2012. *African Indigenous Knowledge System & Sustainable Development: Challenges and Prospects*, People's Publishers, Wandsbeck, South Africa.

The Case Study as a Research Method, Uses and Users of Information -- LIS 391D.1 -- Spring 1997 online 2013

The South African philosophy of "Ubuntu" could inspire youth as our future leaders in a global world
Posted on April 2, 2013 by Jan Brinn, Michigan State University Extension

Verie, (2013 online) http://www.ehow.com/info_8213705_qualitative-research-methods.html

What Is a Qualitative Method? | eHow.com http://www.ehow.com/info_8688755_qualitative-method.html#ixzz2O0hA57Zi