An analysis of regime capacity and a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger River basins

BY

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Special thanks to Prof Hussein Solomon, Ts'oeu Thulo Mahlakeng, Mamahlakeng Mahlakeng and Liteboho Kutloano Mahlakeng.

For my Son Naleli Mahlakeng

"*motho oa leme la khomo koba matlakala, lelu sa khomo se khukhutha fats'e"*

Ahe Phoka!

In Loving Memory

of

Malefu Constance Mosia

†

DECLARATIONS

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Date: May 2017

LIST OF ABBREVIATIONS

1929 Nile Agreement	− 1929 Agreements: Exchange of note between His Majesty's government in the United Kingdom and the Egyptian government on the use of waters of the Nile for irrigation
1959 Nile Agreement	− 1959 Agreement: Agreement between the Republic of the Sudan and the United Arab Republic for the full utilization of the Nile waters
ANC	− African National Congress
AU	− African Union
BBC	− British Broadcasting Corporation
BCM	− billion cubic metres
BCM/yr	− billion cubic metres per year
CFA	− Cooperative Framework Agreement
CIA	− Central Intelligence Agency
CIDA	− Canadian International Development Agency
DRC	− Democratic Republic of the Congo
DWS	− Department of Water and Sanitation
EU	− European Union
FAO	− Food and Agriculture Organisation of the United Nations
GDP	− gross domestic product
GERD	− Grand Ethiopian Renaissance Dam
ha	− hectares

IBRD	− International Bank for Reconstruction and Development
IBTs	− Inter- and Intra-basin water transfers
ICJ	− International Court of Justice
IEA	− International Environmental Agreements
INR	− Institute of Natural Resources
IPCC	− Intergovernmental Panel on Climate Change
IR	− international relations
IWRM	− Integrated water resources management
JIA	− Joint Irrigation Authority
JPTC	− Joint Permanent Technical Commission
LHDA	− Lesotho Highlands Development Authority
LHWC	− Lesotho Highlands Water Commission
LHWP	− Lesotho Highlands Water Project
LHWPT	− Lesotho Highlands Water Project Treaty
NAPAs	− National adaptation programmes of action
NBA	− Niger Basin Authority
NBI	− Nile Basin Initiative
NEPAD	− New Partnership for Africa's Development
NEPAD-IPPF	− New Partnership for Africa's Development Infrastructure Project Preparation Facility
NGOs	− Nongovernmental organisations

Nile-COM	− The Council of Ministers of Water Affairs of the Nile Basin States
NRB	− Nile River Basin
NRBC	− Nile River Basin Commission
NRC	− Niger River Commission
OAU	− Organisation of African Unity
ORASECOM	− Orange-Senqu River Commission
OSRB	− Orange-Senqu River Basin
PCS	− Permanent Court of Arbitration
PSC	− Peace and Security Council
PWC	− Permanent Water Commission
RNB	− Niger River Basin
SADC	− Southern African Development Community
SDAP	− Sustainable development action plan
SWAPO	− South West Africa People's Organisation
SWIs	− Shared Watercourse Institutions
TCTA	− Trans-Caledon Tunnel Authority
TECCONILE	− Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin
TRC	− Transformation Resource Centre
UK	− United Kingdom
UN	− United Nations

UNDESA	− United Nations Department of Economic and Social Affairs
UNDP	− United Nations Development Program
UNEP	− United Nations Environmental Program
UNFCCC	− United Nations Framework Convention on Climate Change
UNPD	− United Nations Population Division
USA or US	− United States of America
VNJIS	− Vioolsdrift and Noordoewer Joint Irrigation Scheme

CHAPTER 1: INTRODUCTION

1.1 Orientation and background

For much of the past century, the hydropolitical landscape of African transboundary river basins has been affected by water scarcity (Elmi, 2002). Xercavins (1999:158) asserts that water scarcity is a condition in which the annual availability of internal, renewable fresh water is 1,000 cubic metres or less per person. Water stress is a condition in which the annual availability of internal, renewable fresh water is less than 1,667 and greater than 1,000 cubic metres per person in the population.

Water scarcity is the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements, to the extent that the demand by all sectors, including the environment, cannot be fully satisfied. Water scarcity is a relative concept and can occur at any level of supply or demand. Scarcity may be a social construct (a product of affluence, expectations and customary behaviours) or the consequence of altered supply patterns stemming from, for example, climate change (UNDESA, 2013).

Twumasi and Merem (2007:173) asserts that transboundary river basins tie states into a web of interdependence. This arrangement is further complicated by the depletion of water resources, which forces nations to look beyond their own borders to respond to the growing water demands.

The analysis of *hydropolitics* refers to the politics of water (Jankielsohn, 2012:125), which symbolises the complex relations and interactions among the states that share river basins. Elhance (2000:202) theorize that hydropolitics relies on two variables: the institutional capacity to address change in the hydrologic system and the rate of said change in the hydrologic system.

Due to numerous factors ranging from environmental to geopolitical issues, it has been argued that transboundary basins can therefore become a source of tension and

conflict[1] (Idule-Amoko, 2009:111; UNESCO, 2009:3). The "*Potential Conflict into Cooperation Potential*" project (PCCP) views the term "*conflict*" as "*an all-embracing notion covering the entire spectrum of possible situations where the interests of states may collide: from minor differences in opinion to the other extreme of situations of tension and hostility that may threaten international peace and security*" (Vinogradov et al, 2003:25). As a result, the possibility of "*water wars"* has been mooted. These are, by definition,

> wars caused by the desire for access to water, in which the scarcity of water determines the means to go to war, (Turton, 2000a:36).

Tulloch (2009) asserts,

> the term itself refers to conflict between countries, states, or groups over access to water resources, and such conflicts come as a result of opposing interests of water users, public or private.

Despite growing criticisms against the fact that water can instigate conflict, however, it is similar to oil in this regard. The availability of water is crucial for countless human activities and as a resource it is limited (Klare, 2002:142). At transboundary river basin level, there are already indicators of potential water wars (Simpkins, 2010)

Water wars emerge within a broader framework of environmental conflicts. Environmental conflicts, according to Libiszewsi (1992:14) are:

> traditional conflicts as a direct result of environmental deterioration and generally become conflicts over resources.

These resources that include agricultural land and water, are part of continuously growing list with categories that range from oil to minerals (Binningsbø *et al*, 2007:338)

The causes, implications and results of these conflicts are traditional concerns of International Relations (IR) (Barnett, 2000:272). Within the broader global environmental politics, it is obvious that IR is experiencing a new landscape of global conflict for resources, where water is at the centre of the competition over resources, as a result of its scarcity (Bujra, 2002:11). Historically, water resources, given either

[1] *"Conflict"* being verbal, political or violent

their abundance and/or scarcity, have been imperative sources that determine the potential emergence of conflict and/or cooperation (Abebe, 2009:125).

According to Klare (2002:139), changes in the quantity and quality of a shared resource makes disputes increasingly heated. Reyskens (2011) similarly asserts that countries become susceptible to conflict if the resource they are dependent on is either threatened or removed. However, Earle (2005:56) hypothesised that if the capacity to absorb change is sufficient to respond to the occurring change, then the vulnerability to conflict can be minimised.

As the demand for this fundamental and essential natural resource increases (Ashton, 2002:1), water has come to be treated like oil and its protection is being insured through militaristic defence (WalesOnline, 2012). In most continents, disputes over international waters are both common and current (Vinogradov et al, 2003:22). Hence, resource-based conflicts have become a major concern to international peace and security when the concept of security is expanded to include environmental security (Mathews, 1989:162). This expansion of the concept of security should include the impacts of environmental stress locally, nationally, regionally and globally (Brundtland, 1987:19; Binningsbø *et al*, 2007). Such concerns emanate not only from humanitarian risks that affect governments. Environmental issues also embody political and security risks that are of great concern to governments' stability (Tadese, 2010:8).

According to Kuokkanen (2017:2), the rapid increase in water-related issues in transboundary river basins prompted attention to water security[2]. This is indicative of the fact that the scope of national and/or international security was not only limited to military aspects but also included various environmental aspects such as water-related threats (Kuokkanen, 2017:15).

[2] Water security as stipulated by the UN Water means *"the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability"* (Koukkanen, 2017:3).

The United Nations (UN) identified the Orange-Senqu, the Nile and the Niger basins, as well as six other African river basins susceptible to potential water-induced conflict, as being at risk of tensions and/or conflict (Idule-Amoko, 2009:110). The focus of this study on African transboundary basins is due to the continent being characterised as a continent at war with itself (Kameri-Mbote, 2005:1). The discourse and interest of the study in water as a potential source of conflict concentrates largely on the Orange-Senqu, the Nile and the Niger River basins respectively. The study takes a comparative perspective of these transboundary river basins and outlines foreseeable transboundary river challenges for regional security, considering the impact of environmental scarcity and regimes.

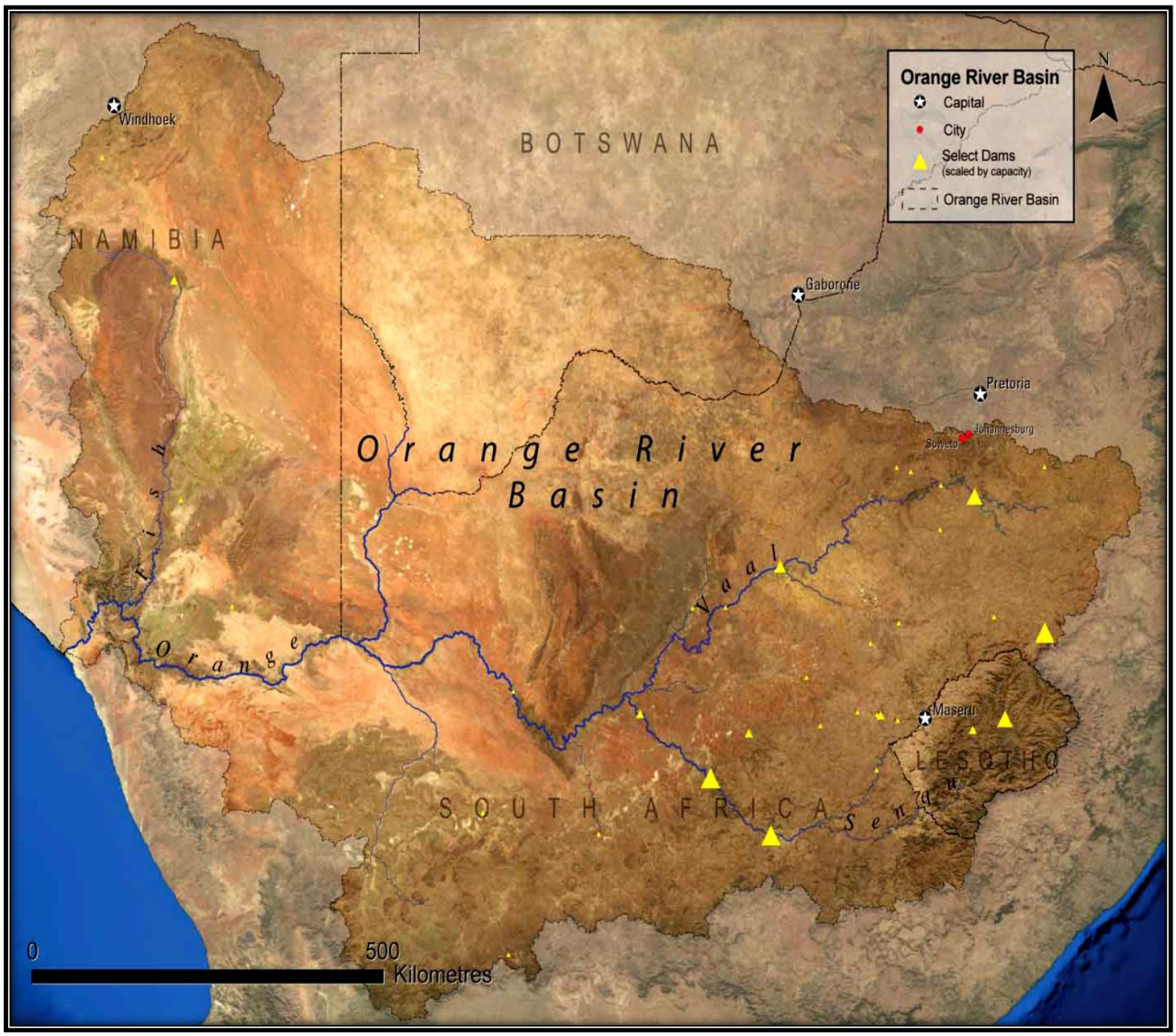
The selection of these basins is prompted by the fact that these regions respectively are marked by serious environmental challenges that are detrimental to combustible hydropolitics over such shared water resources. Moreover, these cases are situated in three different regions and are aligned to different, already functional, regimes with protocols and/or charters on their shared watercourse. As such, they make for a helpful comparative case study analysis. These cases provide ideal and fascinating examples of an analysis of the links between climate variability and change, water resources, human security, conflict, adaptation and regime capacity.

1.1.1. Orange-Senqu River Basin

The transboundary Orange-Senqu River Basin (OSRB) is located in the Southern African region and, after the Congo and the Zambezi river basins, is the third largest river catchment in Africa. The entire Orange River system drains a catchment area of 896,368 km^2, has a total length of 2,200 to 2,300 km and stretches over four countries, as seen in map 1 (Sullivan, 2014:190). This area includes all of Lesotho, a large portion of South Africa, southern Namibia and southwestern Botswana (ORASECOM, 2008).

The OSRB faces challenges of water scarcity due to soil erosion, wetland degradation, pollution, irrigation, mining, industries, population growth, power generation and domestic consumption. The unequal distribution of freshwater resources is also a fundamental factor posing a threat to the economic and social development of the Southern African region (Earle *et al*, 2005:13).

Map 1: Map of the Orange-Senqu River Basin (UNEP, 2010:90)



The Orange-Senqu River Commission (ORASECOM), an agreement reached in 2000, is the first multilateral basin-wide agreement between all four riparian states. The ORASECOM is responsible for the management, sustainability and utilisation of the Orange-Senqu Rivers. Furthermore, it aims to promote the equitable and sustainable development of the resources of the river. ORASECOM provides a forum for consultation and coordination between the riparian states to promote integrated water resource management and development within the basin (Earle *et al*, 2005:23).

1.1.2. Nile River Basin

The Nile is the longest river in the world measuring approximately 4,100 miles or 6,700 km (Kameri-Mbote, 2007:1). The Nile River Basin (NRB) is located in North-East Africa. It is an international water resource that is shared among 11 riparian countries (see map 2), which are the Democratic Republic of the Congo (DRC), Sudan and South Sudan, Uganda, Rwanda, Kenya, Tanzania, Burundi, Ethiopia, Egypt and Eritrea. Its volatility and proximity makes it prone to conflict over water.

Because the Nile flows through and around all eleven before mentioned countries, each of them are highly dependent on the Nile as a water source (Alcamo et al, 1996:336). These countries are divided into downstream countries (Egypt, South Sudan and Sudan) and upstream countries (Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania, Uganda and the DRC) (Marterns, 2011:1).

Map 2: Map of the Nile River Basin (NRB) (Zaki, 2014)

According to Kieyah (2007:2),

> The Nile Basin faces considerable challenges. These challenges include rapid population growth, water scarcity as Nile basin countries are known for their arid and semi-arid conditions, poverty, environmental degradation and uneven distribution of the Nile waters.

The NRB is centrally challenged by disputes over the unequal use of water between upstream and downstream riparian countries (Jacobs, 2006:13; Solomon, 1996:3).

The Nile Basin Initiative (NBI) established in 1999, is a regional intergovernmental partnership. It seeks to create a comprehensive framework for the management, planning and utilisation of the natural resources of the Nile, particularly water (Oloo, 2007:95). The main idea is to allow all riparian countries to participate in processes of dialogue (Wiebe 2001: 751; World Bank, 2008:2). This initiative was launched with the hope that it will create a cooperative effort to manage and develop the Nile, which in turn will benefit the whole region (Balleh, 2014).

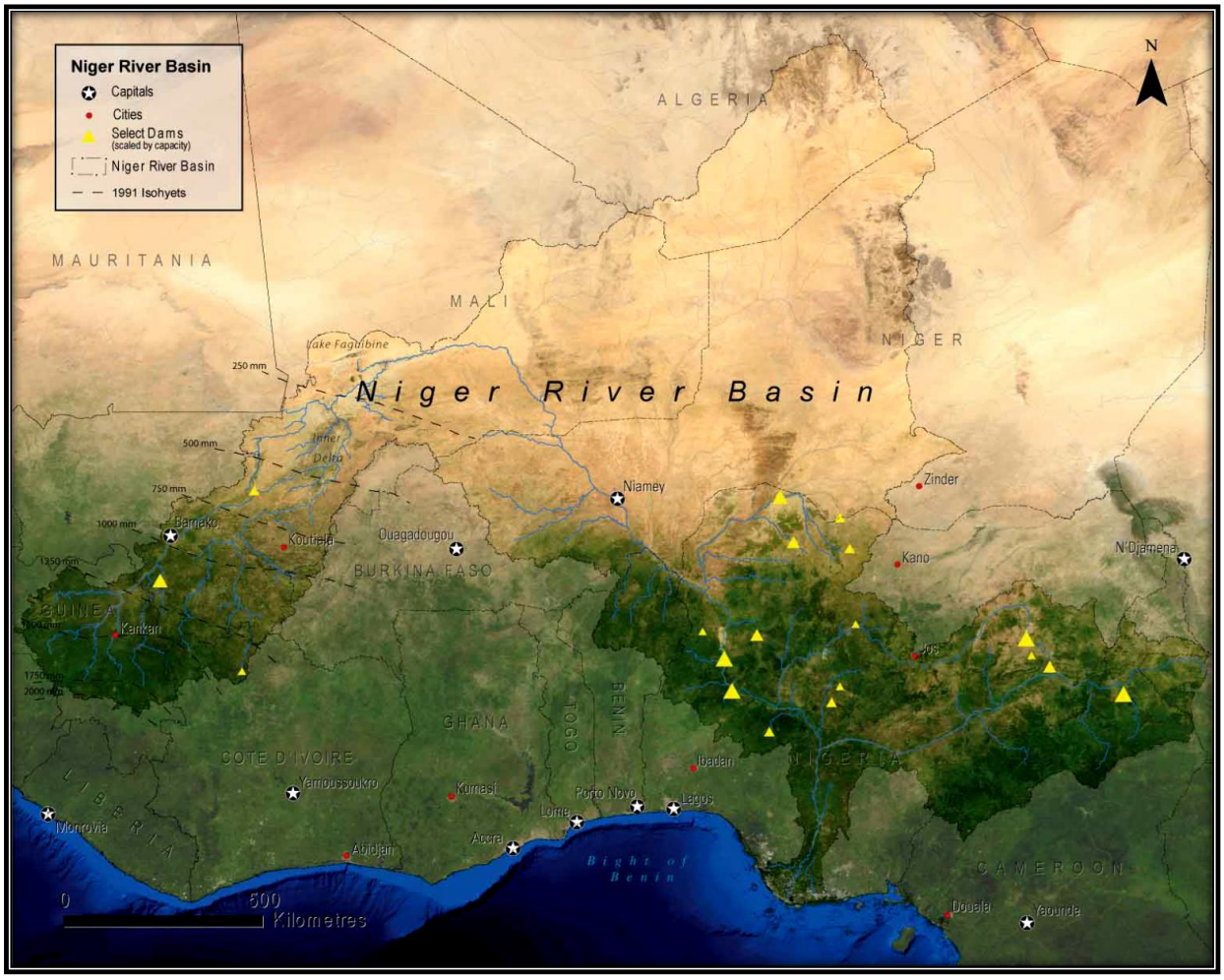
1.1.3. Niger River Basin

The Niger River, located in West Africa, is the third longest river in Africa after the Nile and Congo. It flows for 4,200 km from its source in the Guinea highlands within the humid tropics, through Mali and Niger with their semi-arid Sahelian climates to the Niger delta in Nigeria (Abebe, 2009:122). The drainage basin covers a surface area of just over 2.2 million km², extending into 10 countries (Guinea, Côte d'Ivoire, Mali, Burkina Faso, Algeria, Benin, Niger, Chad, Cameroon and Nigeria) (see map 3), with 76% of its area located in just three countries (Mali, Niger and Nigeria) (FAO, 1997).

The Niger River and its tributaries, with the population growing at approximately 3% a year on average (Andersen *et al,* 2005:1), are a key source of water for the drier regions within the western Sahel zone and a pillar for the economy of the estimated 100 million people living in the basin (Goulden and Few, 2011:5). The RNB was also challenged by population growth (a total population of approximately 100 million, with a growth rate of around 3%), agricultural run-off, oil production (the source of a host of environmental issues) and climate change among other challenges (UNEP, 2010:60-1).

The RNB among 11 African transboundary basins considered to be experiencing water stress. According to the UNEP (2012:18), the concept of water stress applies to situations where there is not enough water for all uses, whether agricultural, industrial or domestic use. Much of the Niger Basin is in a region of low rainfall, with high natural variability in rainfall and stream flows. This affects land and water resources and the livelihoods on which people depend (Goulden and Few, 2011:6). The development of new dams not only raises ecological concerns, but also provokes difficult negotiations over equitably sharing the resources (Diarra, 2011).

Map 3: Map of the Niger River Basin (RNB) (UNEP, 2010:60)



The Niger Basin Authority (NBA), founded and re-founded in 1964 and 1980 respectively, is headquartered in Niamey in Niger. Among its mandates, the NBA is required to ensure the integrated sustainability, management and utilisation of the

Basin. This will enable member states to cooperate and benefit on cross-boundary projects such as energy, agriculture and water (Abebe, 2009:125).

1.2 Theoretical framework: Homer-Dixon's environmental scarcity theory and regime theory

Seeing that much is being said about water conflicts in transboundary rivers systems by scholars of political science, international relations and political geography (Starr 1991; Trolldalen 1992; Biswas/Kolars/Murakami/Waterbury/Wolf 1997; Homer-Dixon 1999; Libiszewski 1999; Toset/Gleditsch/Hegre 2000; Wolf 2000, 2002; Lonergan 2001; Waterbury 2002), the study will similarly approach the subject from two main angles, while supplementing arguments through theory. Firstly, if, how and under what conditions does water scarcity lead to violent conflict or even war? And secondly, how can international rivers be managed and water conflicts be mitigated? In the critical comparative analysis of these three river basins, this study uses Homer-Dixon's environmental scarcity theory, and regime theory also known as institutional liberal theory.

1.2.1. Homer-Dixon's environmental scarcity theory

Homer-Dixon's environmental scarcity theoretical perspective is used to identify a nascent conflict in Africa, specifically in the Orange-Senqu, the Nile, and the Niger River basins. The assumption behind the environmental scarcity approach is,

> resource scarcity, through the three causal forms of scarcity (i.e. demand-induced, supply-induced, and structural-induced scarcity), have the potential to cause conflict, (Homer-Dixon, 1994:8-11; Cabot, 2017:47).

The environmental scarcity theory argues that interstate resource wars may ensue where there is a fixed or shrinking pie of natural resources. The growing population demand, climate change, degradation and depletion, and uneven distribution of water resources can act as a threat multiplier for instability in some of the most volatile regions in Africa, which are highly dependent on transboundary basins. As a result, this warrants stronger regional cooperation and effective water governance on the continent (Centre for Climate and Energy solutions, 2007). Moreover, UNESCO

(2009:2) similarly highlights that "*the need for integrated, cooperative solutions is particularly urgent*" particularly in transboundary basin that two or more riparian state are dependent on.

1.2.2. Regime theory

Regime theory, also known as institutional liberal theory, is used to analyse the institutional capacity in these regions to deal, respond and mediate emerging environmental conflicts. Subsequently, regime theory will help in determining whether these institutional mechanisms are able to adapt to the changing climate and environmental landscape. It is through regime theory that we can fully comprehend why international regimes and agreements are necessary.

Regime theory assumes that once regimes and/or institutions are in place, they are able to mediate between a variety of power and interest variables in a region to produce related behaviour and outcomes in an attempt to foster cooperation in *collective security* among other things (Krasner, 1982:189-90).

In an attempt to conceptualise regimes and find their relevance, a few definitions are provided. According to Keohane (1989:3),

> International regimes are a major type of international institution.

Keohane and Nye (1977:19) defines regimes as,

> sets of governing arrangements that include networks of rules, norms, and procedures that regularize behaviour and control its effects.

North (1990:3) asserts,

> institutions are the formal rules of the game and are humanly devised constraints that shape interaction.

However, a widely accepted definition of a regime is,

> sets of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations, (Krasner: 1982:2).

It is not easy to predict what impact environmental scarcity will have on the levels of cooperation, conflict, vulnerability and preservation of water resources in the region. However, the hydropolitical vulnerability to countries' environmental pressures can be reduced by developing regimes or institutions. Studying water resources and their potential to cause conflict includes not only an assessment of the rivers' natural state, territorial distribution and the changes caused due to climatic variations, but also the response of regional institutions in addressing such issues.

1.3 Problem statement and research questions

There are gaps in existing environment-conflict literature, especially when it comes to analysing Africa's transboundary basins. This study emphasises environment-conflict literature of conflict that stems from a scarcity of resources as opposed to their abundance. A variety of authors, governments, and regional and continental organisations have acknowledged the challenges posed by environmental scarcity. However, they have failed to acknowledge the emergence of potential conflict in shared river basins as a result of both environmental scarcity and institutional capacity. This is despite the changing climate's potential to induce conflict or exacerbate existing instability in some of the world's most vulnerable regions (Werz and Conley, 2012:5).

No attention has been given to the critical features of population, water degradation and depletion because of weather and human disturbances, water distribution and regimes altogether in transboundary river basins. According to Abebe (2009:124) the explosion of populations combined with climate change, degradation and depletion, and unequal distribution of transboundary water resources is causing extreme strain within and between nations.

Homer-Dixon (1999a:67) asserts,

> water has long been a source of contention among certain groups, societies and states.

Disputes over shared water resources could become more frequent in coming decades, mostly in basins shared by numerous countries. For instance, the Nile and

RNB, on which this study focuses, flow through 11 and 10 countries respectively, which makes solutions to equitable water utilisation complex.

Due to the continuing human modification of the environment, the dynamic system and the natural variability of rivers, future riparian responses, disputes and the resilience of political structures is uncertain (Grainger and Conway, 2014:836). As long as such an uncertainty exists, one critical issue remains: a potential conflict between and within states over resources as a result of their related scarcity. This will, eventually contribute to the fragility of regional institutions.

Nonetheless, the security implications of the environment producing conflict have often been ignored, which undermines the security concerns posed by both environmental scarcity and its literature. Dupont (1998:73) views environmental security as an important issue. However, he believes,

> environmental issues are unlikely to be the primary cause of a major conflict between states.

This study acknowledges Dupont's (1998) viewpoint since there are complex linkages between environmental stresses and conflict. It therefore also recognises the idea of regimes. The impact of environmental scarcity is related to poor development policies and institutions that raise societal vulnerability if the issue of the nature of climate and environment is ignored (Goulden and Few, 2011:47).

The contention that resource scarcity will lead to violent conflict has been, and remains, central to environmental security both domestically and internationally (Barnett, 2000:271). Trolldalen (1992:61) asserts,

> competition for both quality and quantity of shared water at a local level often leads to international water conflicts.

Disputes often arise over the quantity and timing of upstream releases in relation to downstream demands. International conflicts in the Nile Basin (Mason, 2004; Arsano 2007), Mekong, Jordan, Euphrates/Tigris and Syr Darya and Amu Darya (Siegfried & Bernauer 2007; Mckinney 2003) are examples. The potential range and scope of the consequences of such conflicts raises concerns about their security implications.

The study sees the necessity of a theory that better explains and acknowledges the potential for environment-caused conflicts. The study views this to be imperative since analyses of the environment-conflict literature by early scholars either had limitations or was speculative in explaining the environment-conflict linkages imprecise subsequently leading to faulty mitigation strategies being initiated.. River basins and aquifers are shared among several countries with markedly different levels of social, economic and political development and with different levels of need for water. Such disparities make conflict inevitable and the search for equitable and sustainable solutions to water sharing complex (Ashton, 2002:1).

The discussion and relevance of regime conceptualisation and theory in the southern, northeast and west African context will further an understanding of the region's developmental dilemmas in the face of the changing environmental and political climate. Godana (1985:264) assets that basin states can only gain by creating a comprehensive commission to serve as an institutional vehicle for cooperation. Similarly, Stephan and Simmons (1987:513) believes

> Regimes have altered the situation or setting in which states interact so that cooperation is more likely.

However, Jacobs (2012:120) contends that multilateral cooperative arrangements are not the only solid footing by which cooperative norms can be achieved. He points out that the institutional design of multilateral agreements can either help or hinder the way in which actors behave as a collective. According to Furlong (2006:442),

> norms can act as necessary precursors to international accords, but are often insufficient to ensure cooperation and are elusive when issues are highly contentious.

Nonetheless, there is an urgent need to consider the role of environmental resources on conflict on the one hand, and ways in which environmental resources can be used to build peace on the other (Kameri-Mbote, 2005:1).

The purpose of this study is to determine, through Homer-Dixon's environmental scarcity theory, the impact and effects of environmental scarcity in contributing to environmental conflicts in the Orange-Senqu, the Nile and the Niger river basins. In

addition, it uses the regime theory to look at how regimes can mediate a nascent environmental conflict in these basins.

As a result the study considers two main research questions. Firstly, is there a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger river basins respectively as a result of environmental scarcity? Secondly, can regimes establish collective, related behaviour and outcomes among riparian countries in these respective transboundary basins to correspondingly address environmental scarcity and avoid environmental conflicts?

The study also considers four subsidiary questions to the main questions:

- How can Homer-Dixon's environmental scarcity theory explain a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger river basins respectively?
- How can regime theory explain the role of regimes in mediating a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger river basins respectively?
- Do regimes possess sufficient capacity to mediate future potential environmental conflict in the Orange-Senqu, the Nile and the Niger river basins?
- Can both Homer-Dixon's environmental scarcity theory and regime theory help in advancing future policy-making decisions pertaining to environment-conflict linkages and regime capacity?

1.4 Aims and objectives of the study

Firstly, the study aims to analyse environmental challenges confronting these three river basins. Secondly, the study discusses the regime capacity and initiatives to address environmental challenges in these three regions. Thirdly, the study aims to determine the applicability of Homer-Dixon's environmental scarcity theory in analysing a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger River basins, subsequently testing its assumption.

Finally, the study aims to determine the applicability of regime theory in analysing the influence that regimes have in mediating potential environmental conflict in the Orange-Senqu, the Nile and the Niger River basins, thus testing its assumption. The study does this by conceptualising and establishing the relevance of regime theory in explaining the impact of regimes vis-à-vis state behaviour.

In terms of specific objectives, the study:

- conceptualises Homer-Dixon's environmental scarcity theory and regime theory.
- critically discusses a nascent environmental conflict in each of the three river basins respectively as a result of environmental scarcity. This will be done through the use of Homer-Dixon's environmental scarcity theory.
- critically discusses the capacity and progress of the ORASECOM in the Orange-Senqu basin, the NBI in the Nile basin, and the NBA in the RNB as governing regional regimes. In achieving this objective, regime theory is used.
- gathers findings that are relevant for policy-makers at local, national, regional and international levels.

1.5 Research methodology

This section describes how the study was conducted and data obtained. This study is rooted in the discipline of IR. The research employs a comparative case study method in analysing the above cases. The comparative case study method offers the researcher the ability to obtain rich data with high validity while situating and interpreting data within a wider context. As such, case studies provide important research settings. While some researchers are critical about the reliability of this method, such criticisms overlook the notion that the case study inferential mechanism relies upon the *cogency of the theoretical reasoning* rather than the typicality or representativeness of the case. Case studies of different countries are typical in international and comparative politics where the focus is on a country or region. This method enables the researcher to draw comparisons.

The study's use of a comparative case study or case-oriented approach is to enable it to analyse set relations of nascent environmental conflicts and regime capacity, and to provide a closer link to theory in area- and county-specific cases. The theories used to determine set relations help in analysing both the sufficiency of environmental scarcity to produce environmental conflicts and the necessity of regimes to respond to these conflicts. The comparative case study approach helps to determine and compare the causal condition and analyse the outcomes in these respective cases

The study is qualitative in nature. This enables it to explain the situation in these case studies, conceptualise how and why this situation has come about and determine the impact it has had or might have on the region and its institutions.

This study uses existing theories and applies them to the Orange-Senqu, the Nile and the Niger River basins respectively as the study's areas of investigation. The research is based on a second-order research (an analysis of texts and statistics). Some of the findings and analysis will be presented in tables and maps. This is meant to enable the reader to contextualise and clarify distinctions in various locations and to analyse data in a visual manner.

The literature of the study is based on official documentation, policy documents, theoretical literature, critiques and discussion papers from the media, reputable newspapers, academic journals, working papers, conferences, lectures, internet sources, theses, books and various collaborative works such as monographs.

1.5.1. Regions and basins of analysis

This study will focus on three African river basins: the Orange-Senqu in southern Africa, the Niger in western Africa, and the Nile in northeast Africa. The study considers mainly large basins in Africa because of their volatility and proximity.

1.5.2. Units of analysis

Determining what causes scarcity and disputes over water between riparian countries requires choosing a relevant unit of study. For the sake of feasibility, the study considers four scarcity and/or dispute-related units:

- Population growth
- Water degradation and depletion
- Unequal water distribution
- Regime capacity.

1.6 Literature review

1.6.1. Literature review on the theoretical perspectives of the study

1.6.1.1. Homer-Dixon's environmental scarcity theory

Homer-Dixon (1994), Hudson (1996), Solomon (1996), Meissner (2000), du Plessis (2000), and Turton (2000a; 2000b) form part of the collaborative works consulted with regards to environmental conflicts. This study reviews these scholars as specialist in the field of environmental studies whose contributions have helped to define a new feature of environmental conflicts and the discourse on water within the realm of IR theory.

Among the secondary sources consulted, this study draws its analysis from Romm (1993), Gleick (1993) and Wolf's 1999 publication, *Water wars and water reality: conflict and cooperation along international water ways*. This literature discusses the transformative nature of resources to include water as the new threat to the security discourse.

In conceptualising environmental conflicts, this study draws its analysis for a theoretical foundation from Homer-Dixon's 1999 work *Environment, Scarcity and Violence*, which argues that violence in many parts of the world is a result of the scarcities of critical environmental resources such as fresh water.

This study views Homer-Dixon's (1991, 1994, 1998, 1999a, 1999b) work as an important theoretical perspective in that it maintains a dual understanding of the human-environment relationship. It does this by showing, in a comprehensive manner, how humans are threatened by the environment and vice versa. He has featured water as an important variable, among other environmental factors, that could lead to violent conflict (Homer-Dixon, 1998:8).

This chapter focuses mainly on the scarcity of renewable resources,[3] which is so severe that it has the potential to cause violence and conflict. Homer-Dixon's theoretical perspective and application is of utmost importance as it illustrates the contribution of the scarcity of renewable resources to conflict by providing environment-conflict linkages (Homer-Dixon, 1994; Homer-Dixon, 1999a; 1999b). In establishing and maintaining the environment-conflict linkage, he argues that rapid population growth, unsustainable management, development and use of resources, depletion and degradation of resources, and unequal resources distribution are primary causes of environmental scarcity (Homer-Dixon, 1999a:48).

Authors such as Myers (1993), Tir and Diehl (1998), Baechler (1998) and Matthew (1999) also considered both theoretical and empirical work in direct and/or indirect environment-conflict linkages.

This study has adopted Libiszewski's (1992) definition of environmental conflict as encompassing all resource-related disputes. However, with a focus on water wars the study uses Turton's (2000a) definition as it clearly reflects conflict over water resources by a variety of water users (refer to 1.1 of this thesis).

In analysing the potential for conflict over cooperation between riparian countries that constitute a clear upstream-downstream relationship in transboundary rivers, Delbourg and Strobl's *Cooperation and conflict between upstream and downstream countries in African transboundary rivers* (2012) provides an important analysis of the

[3] Renewable resources include fresh water and soil among others. Their scarcity describes a situation in which these resources in a given area are insufficient to satisfy current human demands for these resources (Ide, 2015:62)

relationship between population and dams within the context of triggering disputes and tensions between and within riparian countries.

Other authors that advance the environment-conflict debate include Gleditsch *et al* (2006), Klare (2001), Toset *et al* (2000), Schwartz and Singh (1999), Percival and Homer-Dixon (1998), Homer-Dixon and Blitt (1998), Bingham (2001), Urdal (2008), Gleick (1993), Chesire (2010), Schwartz *et al* (2000), Ashton (2002), and Libiszewski (1992). This literature discusses the transformative nature of resources to include water as the new threat to the security discourse.

1.6.1.2. Regime theory

The study draws on the work of institutional liberal theorists such as Krasner (1982; 1991) *Structural causes and regime consequences: Regime as intervening variables* and *Global communications and national power: Life on the Pareto Frontier* respectively, whose work has been fundamental in defining regimes and regime theory. Krasner's (1982; 1991) work is mostly essential for developing an assumption that aims to determine and explain the impact of regimes and/or institutions on state behaviour.

Keohane (1977; 1980; 1982; 1989; 2012), who is crucial to the neoliberal institutionalism perspective of IR, is similarly important to understanding regimes as he provides a conceptualisation of how regimes facilitate norms that encourage related behaviour of states in an institutional setting as opposed to self-interested behaviour. According to Keohane (1982:337),

> regimes facilitate the making of substantive agreements by providing a framework of rules, norms, principles, and procedures for negotiation.

Other leading theorists in the field of regime theory include Hasenclever *et al* (2000), Grieco (1988; 1990), Domhoff, 2006, Keohane and Nye (1977), Godana (1985), Stephen and Simmons (1987), Jacobs (2012), and Furlong (2006).

1.6.2. Literature review on the three transboundary river basins

1.6.2.1. The Orange-Senqu River Basin

ORASECOM (2013) is essential to this study for knowledge of the background and nature of the OSRB and its commission. Earle *et al* (2005), *A preliminary basin profile of the Orange/Senqu River*, highlights the hydropolitical situation and environmental issues in the basin.

Earle (2005) discusses the underlying factors that create vulnerability to conflict as a result of hydrological changes as well as the legal and institutional responses to such changes. He argues that it is crucial to analyse the hydropolitical vulnerability landscape in southern Africa to understand the potential of conflicts over the OSRB. In addition to Earle's (2005) arguments, Turton (2000a:57−58) highlights variable rainfall, large dams, resource extractive industries (mining), population, and institutional and social adaptability to water insecurity as the key issues that cause hydropolitical vulnerability. The following legal documents will be used: the *1986 Lesotho Highlands Water Project (LHWP) Treaty between the government of the Kingdom of Lesotho and the government of the Republic of South Africa*; the *2000 Southern African Development Community (SADC) Revised Protocol on shared watercourses in the Southern African Development Community*; and the *1992 Permanent Water Commission (PWC) bilateral agreement between South Africa and Namibia*.

1.6.2.2. The Nile River Basin

Baecher *et al* (2000) has essentially addressed the challenges confronting the Nile. The work *The Nile Basin: Environmental transboundary opportunities and constraints analysis* provides a crucial demand-supply linkage. According to Baecher *et al* (2000:11), the countries along the Nile are confronted with population growth. Further, population size affects agricultural productivity, which is affected by resource degradation that is, in turn, affected by the land-use decisions people make based on population size.

Other authors and studies pivotal to analysing the link between population pressure, environmental degradation and armed conflict include, Dakkak (2013), NBI (2005), Ayad (2013), UNEP (2006; 2012), Turton (2000b) and Urdal (2005; 2008).

The International Water Law Project is important to outlining the distributive politics of the Nile by stipulating provisions in the agreements governing the Nile. Both Knobelsdorf (2006) and Wolf (1996) outline the water allocation to riparian countries in the Nile in accordance with the treaties governing the Nile waters. Their analysis clearly underpins the *uneven distributive* nature of these agreements.

In the broader context of disputes over water in the NRB, Ashton (2000:65−71) argues that the situation in the NRB is a result of treaties that subordinate the interest of other riparian countries sharing the same water course. In *Avoiding conflict over Africa's water resources,* Ashton (2002) argues that the bone of contention or competition between upstream and downstream countries for the same water resource poses the greatest potential threat for conflict over water in Africa. The dispute may be exacerbated by slow economic and social development, famine, chronic malnutrition, and the internal and border disputes found in most upstream countries as a result of water scarcity (Klare, 2002:142). Kameri-Mbote (2007), Allan (1999), Demeke (2013), NBI (2012(a)(b); 2014), Lie (2010), Othieno and Zondi (2006), and Link *et al* (2014) are crucial to addressing the challenges facing the capacity of the institutional mechanism to address the hydropolitical problems confronting the Nile.

In determining regime capacity in the NRB, protocols for this region and whether they are being applied by the respective regimes to address sustainability, management and utilisation of the river, this study will consider: Tadese, K.W (2013), *International Watercourses Law in the Nile River Basin: three States at a crossroads*; African Union (2003), *African convention on the conservation of nature and natural resources*; African Union (2000), *Africa water vision 2025: Equitable and sustainable use of water for socioeconomic development;* and the NBI website. Moreover, the following legal documents form part of the literature of the study: the *1929 Agreements: Exchange of note between His Majesty's government in the United Kingdom and the Egyptian government on the use of waters of the Nile for irrigation*; the *1959 Agreement: Agreement between the Republic of the Sudan and the United Arab Republic for the*

full utilization of the Nile waters; and the *Agreement On the Nile River Basin Cooperative Framework*.

1.6.2.3. The Niger River Basin

The study on the Niger region, which includes the work of Djiré *et al* (2010), has taken cognisance of the links between conflict and water scarcity or access to water. Passarelli and Michel's (2014) work *The climate wars are already here* provides an overview of the impact of water scarcity, depletion and climate change on the emergence of conflict in the RNB, in the presence of already pressing challenges ranging from the sharpening confrontations between farmers and herders over access to pastures and wells, to the spurring emergence of Boko Haram in the Niger region.

Passarelli and Michel (2014:1) posit,

> in the Niger River Basin, climate change, an exploding population and poor infrastructure have formed a perfect storm for a new era of conflict.

In further analysing the challenges brought by climate change to the occurrence of conflict in the RNB, this study draws on the works of Goulden and Few (2011), which establishes a link between climate change, human security and violent conflicts; and Idule-Amoko (2009), which focuses on the challenges of climate change in transboundary resources, with specific focus on the Niger.

Abebe's (2009) work *Natural resource conflicts in West Africa: The case of the Niger River Basin,* on the other hand, is crucial to revealing the potential of resource conflicts in the NRB.

Similarly, this study determines regime capacity in the RNB, protocols that exist in this region and whether they are being applied by the respective regimes to address sustainability, management and utilisation of the river. This study considers the following legal documents in its analysis of regime formation and capacity of the RNB: the 1963 Niamey Agreement, concerning the Niger River Commission (NRC) and navigation and transport on the Niger River; the 1980 convention creating the NBA (with protocol relating to the Development Fund of the Niger Basin); and the 1987 revised convention for the establishment of the NBA.

1.7 Outline of the study

This study is divided into six chapters. Chapter one provides the framework of analysis of the topic; that is, the problem statement, aims and objectives, literature review and methods that apply to the study, and its structure.

Chapter two provides a theoretical foundation of the study, which rests on Homer-Dixon's environmental scarcity theory, and regime theory. The chapter analyses the meaning and importance of these theoretical frameworks in the context of transboundary river basins. This study provides a critique of these theories and a defence for supporting these theories.

The study uses this theoretical approach to environmental conflicts to provide an understanding of the disputes in these transboundary river basins and to establish the link between environmental scarcities and violent conflict. In this respect, the study analyses certain outstanding issues such as the rising population growth, water depletion and degradation, and the uneven distribution of the Orange-Senqu, the Nile, and the Niger.

On the other hand, regime theory proposes ways and means through which conflict can be mediated, thus increasing the likelihood of cooperation. The hypothesis behind regime theory is that the establishment of regimes or institutions can lead countries having related behaviour and outcomes in shared interests. The institutions in question are the ORASECOM, the NBI, and the NBA.

Chapters 3, 4 and 5 focus on the OSRB, the Nile River Basin and the Niger River Basin respectively. These chapters firstly examine the impact of environmental scarcity in the respective basin. Secondly, they examine the existence, role and progress of the respective regimes or institutional mechanisms that aim to deal with environmental scarcity in the respective basins.

Chapter six provides a summary, recommendations and concluding remarks of the study. It discusses research findings by evaluating the nature of the disputes and their implications for the riparian countries.

CHAPTER 2: THEORETICAL FRAMEWORK: HOMER-DIXON ENVIRONMENTAL SCARCITY THEORY AND REGIME THEORY

2.1 Introduction

The link between the environment and conflict has been a subject of discussion for a while (Kameri-Mbote, 2005:2). Various research aspects of environmental conflict have been critically received and discussed. A number of unresolved dilemmas emerge from these debates that characterise the literature on environmentally-induced conflict (Hagmann, 2005:11).

With an increase in ethnic and ideological tensions witnessed in interstate conflicts (Kreamer, 2012:88−89), Klare (2001:57) argues that the competition for access to vital resources has become yet another driver for conflict in IR. William (1996:3) and Magdoff (2013) argue that the scarcity of renewable resources remains the most detrimental environmental problem. According to Schwartz and Singh (1999:8), the demand for scarce resources increased the likelihood of international competition over existing supplies of natural resources, which could ultimately lead to escalating tensions.

By the end of the 20th century and the beginning of the 21st century, the realm of IR was characterised by the growing saliency of resource geopolitics, i.e. the potential of conflict as a result of the scarcity of vital resources that cross political boundaries (Diehl, 1991:11). In recent literature, scholars have focused on the role that water plays in international affairs and international conflicts. As a result, they have supported the notion that water will be the future cause of interstate conflict (Yoffe and Wolf, 2002). Furthermore, Homer-Dixon (1999a:66) asserts,

> the scarcity of freshwater resources will be one of the chief resource issues of the 21st century.

Toset *et al* (2000:274) argues that globally, available water adequate for human consumption and deemed as *"freshwater" constitutes merely 3%*.

Witnessing the perceived scarcity of water resources, however, water can be augmented through inter-basin transfers (IBT) or through the desalination of seawater. Both of these options supply an additional quantity of freshwater to an economy and are used in many parts of the world to compensate for water scarcity (Earle, 2005:63). Desalination plants[4] can be used to change the current percentage of available water supply for human consumption by reducing salt levels to below 2 grams per gallon, which is the limit for safe human consumption (Schirber, 2007). Although Inter- and Intra-basin water transfers (IBTs) and desalination plants are a viable option, however, the financial cost of both technologies is high (Schirber, 2007). In addition, both have possible environmental and social impacts (Earle, 2005:63).

The scarcity of transboundary basins can generate and intensify competition among riparian countries. An intensified competition over limited supplies of water can eventually prioritize access to water as a national interest issue. As such, the scarcity of water will therefore increasingly influence interstate politics, and increase the likelihood of conflict (Gleick, 1993:79−80).

In 1996, the United Nations Environmental Program (UNEP) analysis pointed out,

> in the near future, interstates disputes will be characterised by conflict over water supplies (Chesire, 2010:15).

The belief that water scarcity is an obstacle to economic development and that the social stresses it causes lead to conflict is almost conventional wisdom in IR among scholars of international security (Homer-Dixon, 1999a:138). Hence, water scarcity is closely linked to both intra and interstate conflict (Kreamer, 2012:87−88).

Gleditsch *et al* (2006:362) also argues that shared water resources have become a contributing factor to interstate disputes in different forms over the years. From 1950-2000 there have been 1,831 water conflicts over transboundary basins. Shared water resources constitute a source of conflict if the river moves *across* instead of *along* a border (Toset *et al*, 2000:980−1). Purkitt (2009:63) concurs with the notion,

> river water produces a potential [for] conflict between riparian states.

[4] *a process that removes salts and minerals from saline water* (Schirber, 2007)

With regard to conflict over rivers, the trend indicates that the pressures leading to conflict are greater today than in the past due to increasing scarcity (Purkitt, 2009:63).

Predictions of water wars around the globe have become a focal point of IR and have become firmly embedded in global diplomatic discourse (du Plessis, 2000:9). Despite contending beliefs regarding the occurrence of water wars, current river water shortages, the fierce competition for shared rivers and the uneven distribution of international shared rivers constitute conditions for water conflicts (Postel and Wolf, 2001:60). Similarly, the United Nations (2013:8) argues that many studies have concluded that water shortages and competition for water is at the centre of the global security challenge and could increase the risk of conflict.

Water resources are needed to guarantee the growth of industry and investment. Consequently, in regions with high dependence on water, competition emerges among corporations, populations and other states. Over time, this competition over limited water resources may lead to internal and cross-border tensions and conflict (Van Schaik and Dinnissen, 2014:30).

Potential conflicts may arise among countries that share transboundary river basins as a result of water scarcity, the control of these resources and sharing arrangements (Tanzler *et al*, 2002:63). Moreover, water scarcity is significantly detrimental to Africa's transboundary river basins. Despite the availability of valuable resources they exist in relatively small amounts as a result of degradation (Klare, 2002:142). Degradation in this instance refers to negative environmental changes that ultimately affect society (Libiszewski, 1992:4). Such degradation is a common cause of environmental conflicts (Libiszewski, 1992:14; Homer-Dixon, 1991:79).

Similarly, Homer-Dixon (1999a:48) argues that the emergence of these environmental conflicts is exacerbated in areas where resources were once plentiful (Homer-Dixon, 1999a:48). In spite of many attempts in the post-Cold War period, the global water crisis remains unresolved and water shortages have the potential to threaten global peace, prosperity and stability. This crisis has been aggravated by factors such as accelerating population growth, increasing depletion and degradation, increasing

unequal distribution, national or regional conflicts and the influence of climate change on the water cycle (Swain and Krampe, 2011:16−17).

Resources like water and land or environmental damage can be important ingredients in a complex blend of political, cultural, and economic factors that eventually lead to violence (Gendron and Hoffman, 2009:1; Van Schaik and Dinnissen, 2014:12). It should be noted that environmental stress plays a big role in establishing the social, economic and political conditions in which conflicts originate (Goulden and Few, 2011:25).

Carius and Imbusch (1999:20), have also acknowledged that conflict depends on a series of socioeconomic context variables. They further stipulate that these *context variables* encompass,

> cultural circumstances and traditions, ethno-political factors, civil society mechanisms of peaceful conflict resolution, the stability of the interior policy system and, finally, societal, institutional, economic and technological capabilities.

In their review of environmentally-induced conflicts, they found,

> environmental changes and the increasing scarcity of natural resources play a decisive role in the emergence of conflicts.

Scholars such as Purkitt (2009:62) agreed with the notion that the scarcity of land and water will lead to resource wars. This is because the 21st century has been challenged largely by resource scarcity, mostly linked to land and water resources (Qasem, 2010:7). According to Homer-Dixon (1999a:47), resource scarcity is a widely and/or constantly encountered feature of our existence.

Early in the 1980s, the debate intensified on the relationship between environmental degradation and resource scarcity on the one hand and security on the other. From the beginning this debate saw diverse concepts of environmental security being put forward by various policy-makers and institutions (Tanzler *et al,* 2002:116). On the broader issue of environmental security, there has been a growing understanding of the ways in which environmental scarcity may trigger violent conflict (Leroy and Gebresenbet, 2011:9).

Although environmental change is not a new phenomenon, the pace at which this change is occurring is worrisome (Bronkhorst, 2011:29). Towards the end of the 20th century, both academic and policy debates have focused on violent conflicts that arise, particularly in poor countries, as a result of environmental scarcity (Kameri-Mbote, 2005:2).

This chapter focuses on Homer-Dixon's environmental scarcity theory to illustrate the potential for conflict with relevance to water in transboundary river basins. Water is a basic necessity of life. It also plays a fundamental role in human development. Aside from domestic daily use, it is crucial for agricultural and industrial purposes. Inequality of access to the resource, as well as its mismanagement, undermines welfare, affects human security and creates the risk of conflict. Thus, water scarcity is not limited to a concern over the environment and development. It has become part of the political agenda and an important national security issue (Swain and Krampe, 2011:16).

Homer-Dixon's environmental scarcity theory is also used to identify the environmental challenges confronting transboundary river basins that may eventually lead to conflict. Although Homer-Dixon's environmental scarcity theory focuses mainly on intra-state civil violence including ethnic clashes and insurgencies, the study aims to expand the environmental scarcity theory to include disputes and tensions *between states* over shared renewable resources. According to Neumayer (2001:122), this is simply because many of these environmental problems are international and/or global. They cannot be tackled by one state alone because they directly or indirectly affect the entire region (Neumayer, 2001:122).

The impact of these environmental scarcity challenges and/or problems can generate social instabilities within countries that could eventually instigate conflict among nations. However, in the context of transboundary river basins, disputes between states are probable. The potential for inter-riparian conflict in transboundary river basins is due to rapid population growth, degradation and depletion, and uneven distribution, all of which reduce available water resource outputs (Homer-Dixon, 1999a:12).

However, Homer-Dixon's environmental scarcity theory has its limitations. Although it includes *authoritative institutions* in its analysis (Homer-Dixon, 1991:91), it emphasises the scarcity of the environment as a nascent cause of conflict. Homer-Dixon's environmental scarcity theory cannot determine the formation and effectiveness of regional institutions to respond to these challenges and changes in the environmental system. It acknowledges that transboundary basins create hydrological, social and economic interdependencies between societies, complicating transboundary water management (Munia *et al,* 2016:1). Despite the theory being able to outline ways in which environmental scarcity can affect institutions, however, it falls short in explaining the formation, role, capacity and effectiveness of institutions and regimes in countering the environmental scarcity threat.

As a result, an analysis of the governance of transboundary river basins is needed. To explain the formation and success of transboundary river basin management, this study makes use of regime theory. Regime theory is used to indicate the necessity of regimes and regional institutions to address these environmental problems as a means of avoiding conflict between states sharing transboundary river basins.

More attention needs to be given to regional environmental scarcities of water in the developing world. Regional scarcities of renewable resources are already affecting large populations, mostly in poor countries (Homer-Dixon, 1999a:14). According to Homer-Dixon (1991:76), environmentally-induced conflicts are likely to arise first in regions with weak institutional designs and settings in the developing world due to their vulnerability to environmental change. The institutional settings of the regions concerned are important in both explaining and resolving conflicts between riparian countries.

The role of regimes in mediating state behaviour in IR has become an increasingly meaningful analysis. International regimes are seen as clear set of rules that administer and monitor state conduct in the field of IR. The main idea behind regime theory is to explain factors leading to regime formation and success (Raadgever, 2005:3). It has been argued that the deterioration of the environment has resulted in the vulnerability of regions and their regimes (Kameri-Mbote, 2005:1; Pereira, 2015:199).

When analysing the role of the environment in conflict and of regimes in mediating conflicts, it is imperative to consider each unique and complex social, economic, political, cultural and structural context. This is because environmentally-induced social and political crises include domestic natural events that often lead to unrest and revolts that may threaten a government or regime (Tanzler *et al,* 2002:60). Homer-Dixon's environmental scarcity theory and regime theory therefore help us to deal with these complexities and challenges by providing approaches that address both the environmental and institutional issues. Understanding how and when conflict or cooperation occurs helps to evaluate the extent to which water scarcity and regimes matter.

The first section of the study will provide a discussion on Homer-Dixon's environmental scarcity theory in relation to the effects of environmental scarcity on shared resources, which exacerbate a nascent environmental conflict between sharing countries. The second section will discuss regime and institutional capacity in mitigating such nascent environmental conflicts through the use of regime theory. The chapter aims to offer theories that may be useful to policymakers in analysing nascent environmental conflicts and regime capacity.

2.2 Homer-Dixon's environmental scarcity theory

In policy circles, scarcity-related phenomena are often related to political unrest and conflicts. Environmental stresses, therefore, tend to receive more attention on the political agenda, especially to create a sense of urgency to address environmental issues and scarcity phenomena. Some critics say this is unjustified and they point out that evidence of the relationship between environmental stresses and insecurity is far-fetched. Instead, they refer to other conflict risks, such as economic, socio-political and demographic factors (Van Schaik and Dinnissen, 2014:12).

Hendrix and Salehyan (2010:15) propose that it is the interaction of environmental stress with social and political factors that is key to whether water-related conflict develops or not. Similarly, Raleigh and Kniveton (2012:52) emphasise that conflict is complex, sometimes linked to resources but often fundamentally rooted in other factors such as climatic, socioeconomic, political and institutional factors. According

to Kameri-Mbote (2005:2), Homer-Dixon (1991, 1994, 1998, 1999a, 1999b) is the foremost academic advocate of environment and conflict linkages. Homer-Dixon developed models to demonstrate the linkages between renewable resources scarcity and conflict. And these models have generated deep concern for environmentally-induced conflict (Homer-Dixon and Blitt, 1998:1).

Furthermore, Homer-Dixon (1994; 1999a; 1999b), argues strongly for the existence of a relationship between conflict threats and environmental factors, notably scarcity of natural resources. In many parts of the developing world, environmental scarcity, especially land and water, are worsening rapidly. This worsening scarcity has a immediate direct and/or indirect impact on the well-being of people dependent on these resources (Homer-Dixon, 1999a:53).

Homer-Dixon (1999a) has been an important contributor to the environment –conflict literature also arguing that among other renewable resources, the scarcity of water could play a key role in the emergence of violent conflicts (Homer-Dixon, 1999a:8). Homer-Dixon's environmental scarcity theory demonstrates how such scarcity can actually produce instabilities thus leading to conflict (Homer-Dixon, 1999a:4). It does this by explaining the role that environmental changes and patterns play in the emergence of conflict (i.e. environment-conflict linkages). Homer-Dixon (1999a:4) similarly supports the views raised earlier by the study that the findings of the environment-conflict literature made by early scholars were limited and inaccurate. Often ignoring certain institutional and/or environmental factors involved in the environment-conflict nexus.

For instance, Homer-Dixon (1999a:4) makes reference to the work of Norman Myers, (1996) *Ultimate Security: The environmental basis of political stability* and (2004) *Environmental security: What's new and different?* He argues that Myers' work on the environment-conflict linkages is marked by an absence of empirical and theoretical structure. Although Myers (2004:3−5) briefly elaborates on the environment-security linkages and maintains that there is a lack of predictive capacity, his analysis is also predictive and, as a result, lacks empirical and theoretical support.

Factors that influence the emergence of environmental scarcity are multifaceted (Conteh-Morgan, 2004:240; UNIFTPA, 2012:8). Resource depletion and degradation occurs as a result of the susceptibility of resources, the high dependence on resources, resource distribution and poor governance structures. The assumption behind Homer-Dixon's environmental scarcity approach is,

> resource scarcity, through the three causal forms of scarcity (i.e. demand-induced, supply-induced, and structural-induced scarcity), have the potential to cause conflict (Homer-Dixon, 1999a:8, 177).

The arguments of the study are central to this assumption. The concept environmental scarcity incorporates these forms of scarcity (Conteh-Morgan, 2004:239). It is therefore not beneficial for the environment-conflict literature for an analyst to focus only on one form of scarcity.

The environmental scarcity theory denotes that environmental scarcity (i.e. demand-, supply- and structural-induced scarcity) should be viewed as a cause or process that involves all these three causal forms of scarcity and they often occur simultaneously and influence one another (Homer-Dixon, 1994:8-11; Conteh-Morgan, 2004:239).

> The interaction of resource demand and depletion influences and aggravates the effects of unequal resource supply (Schwartz *et al*, 2000:80).

The fundamental basis of the environment and conflict linkages explained that resource scarcity, as a result of environmental degradation, population growth and resource distribution, communicates a clear and common message to a wide variety of conflict specialist (Kameri-Mbote, 2005:2). These three causal forms of scarcity will be explained in detail in the following sections. Environmental scarcity is defined as

> the deterioration in resource availability such as freshwater or soil (Bingham, 2001).

This means that the quality and quantity of water for instance, has declined to a point where it is insufficient to meet the demand (UNEP, 2012:29).

Homer-Dixon's environmental scarcity theory makes it possible for researchers to integrate these three forms of scarcity into one study. Hence, the theory argues that researchers should study shared resource disputes on the basis of demand, supply and structural-induced scarcities concurrently (Homer-Dixon, 1994:8−11). It has been

empirically proven that the interaction of these forms of scarcity over a shared resource is key to the emergence of tensions and disputes (Homer-Dixon, 1994:8; Urdal, 2008:593). Scarcity, driven both by ongoing processes of environmental degradation and escalating population growth, is believed to be rapidly increasing in many marginal environments.

There are concerns that this combination of resource depletion and increasing demand may increase competition and conflicts (Munia *et al.* 2016:1). In many regions, resource availability is being squeezed by both supply and demand pressures. The scarcity of water as a vital natural resource guarantees future social unrest, geopolitical frictions and war (Klare, 2013). According to Ohlsson (1999:211), the driving force for conflict over water between countries is the desire to increase supply and manage demand. Environmental effects may cause social effects that, in turn, could lead to conflict (Homer-Dixon, 1991:79).

2.2.1. The interaction and effect of demand-, supply- and structural-induced scarcity

There are four principal social effects of these types of scarcity:

- Decreased agricultural potential
- Regional economic decline
- Population displacement
- The disruption of legitimised and authoritative institutions and social relations (Homer-Dixon, 1991:91).

First, environmental change (in the form of supply-induced scarcity and/or the depletion and degradation of environmental resources such as water) reduces or constrains agricultural productivity (Cabot, 2017:47). Worsening deforestation and scarcity of water have huge effects on agricultural production, thus affecting food outputs. For instance, deforestation changes hydrological cycles by affecting transpiration rates, soil moisture and precipitation patterns. This will result in erosion and silting, and ultimately lead to incidences of drought and flooding that constrain irrigation capacity and regional productivity. Deforestation also results in degraded and

eroded soils, which affects root depth. This makes plants vulnerable to drought and eventually affects agricultural productivity.

However, the overuse and pollution of water supplies can also result in constrained irrigation capacity and regional productivity (Homer-Dixon, 1999a:81). Homer-Dixon (1999a:87) further suggests that institutions are largely helpful in assisting countries and their agricultural systems to respond and/or adapt effectively to rising land and water scarcities. If these institutions fail, then the availability of water will decrease and agricultural systems will remain inefficient.

Second, regional economic declines can be caused by supply-induced scarcities such as environmental degradation and depletion. This form of environmental scarcity may negatively affect the economy of a region, either directly or indirectly through other social effects such as changes in agricultural productivity. Consequently, environmental scarcity can depress the economy's long-term productivity, which may have a large effect on a country's overall economic development (Homer-Dixon, 1999a:89).

Deforestation leads to water shortages as a result of erosion and silting. This may disrupt hydropower production and river volumes, thus simultaneously reducing or constraining both regional agricultural productivity and economic productivity. The resulting overuse and pollution of water supplies can also affect and constrain economic productivity by giving rise to waterborne human and animal disease such as cholera. This is an indication that a variety of environmental stresses could affect wealth production (Homer-Dixon, 1999a:88-9).

Third, Homer-Dixon (1999a:93) argues that environmental scarcity can also lead to massive population displacements and/or migrations to neighbouring regions (Saleyhan, 2008:319). This is evident in the effects of the three sources of scarcity. Demand-induced scarcity, brought about by population growth, is a direct and major cause of population displacement as population growth critically reduces per capita access to water in a specific area, thus forcing people to move (Homer-Dixon, 1999a:95; Cabot, 2017:47).

Supply-induced scarcity, brought about by water degradation and depletion, also causes population movements (Conteh-Morgan, 2004:239). The reduced water output, combined with population growth, places immense pressure on already limited per capita access to water, forcing people to move (UNIFTPA, 2012:9 and 29). Structural-induced scarcity, brought about by the unequal distribution of water, produces a wide gap between areas with and without water, eventually creating gaps between people's current satisfaction and potential satisfaction elsewhere (Cabot, 2017:47). As a result, this may also lead to people moving to these perceived areas of satisfaction (Homer-Dixon, 1999a:95−6).

Lastly, the failure of authoritative institutions to help societies adapt to scarcities also raises the probability of violence. This is because weak state institutions reduce the ability of societies to generate and deliver the social and technical ingenuity needed to respond to environmental scarcity (Homer-Dixon, 1999a:98). The failure of these institutions is evident in their inability to improve and/or build infrastructure such as wells, dams, canals, pipelines, irrigation systems and large facilities to control industrial and municipal pollution. Institutions are required to respond to the increasing financial and political demands on the state in order to deal with severe water scarcity (Homer-Dixon, 1999a:101).

Severe environmental scarcity can also exacerbate divisions among groups sharing a particular resource. Scarcity increases the gap between winners and losers, i.e. between groups that gain from scarcity and those that suffer from it. This gap encourages competition among groups for the control of resources critical for survival. In addition, the divisions and gaps among groups are social effects of environmental scarcity that can also aggravate social relations, which can disrupt institutions (Homer-Dixon, 1999a:96). These four social effects, either individually or in combination, produce or exacerbate conflict (Homer-Dixon, 1994:6).

Moreover, the three sources of scarcity have a special political significance and can interact and reinforce each other in extraordinary ways. If these three sources of scarcity interact, conflict is inevitable. The first aspect of this interaction, *resource capture*, is very significant in the case of a shared resource. Resource capture occurs when supply and demand pressures outstrip resource availability. This situation in turn

forces powerful groups or states to use regimes in their favour to confiscate resources, ultimately causing structural scarcities on weaker states (Homer-Dixon, 1999a:15). Another motivation for resource capture is greed. Securing water resources at the expense of other riparian countries simply means that this will open opportunities (Homer Dixon, 1999a:74).

The second aspect of this interaction is *ecological marginalisation* (Homer-Dixon, 1999a:15). Environmental scarcity will produce large numbers of environmental refugees[5] (Homer-Dixon, 1999a:93; Saleyhan, 2008:316). The combination of demand and structural-induced scarcities can produce large numbers of migrants, who will in turn instigate supply-induced scarcity. Migration is fundamental in causing environmental degradation and depletion mostly if it occurs in ecologically fragile regions with poor institutional and financial capacity to preserve resources. And this subsequent environmental damage as a result of high population densities can lead to chronic poverty, resource competition, and ultimately violent disputes (Homer-Dixon, 1999a:15).

2.2.2. Simple scarcity conflict

The notion that river water is likely to cause interstate resource wars is deeply rooted in the fact that river water flows from one area to another. As a result, one country's access can be affected by another's actions. The argument that the scarcity of renewable resources like water will lead to violent conflict suggests that the physical control of these resources will provoke interstate simple scarcity conflicts (Homer-Dixon, 1999a:228). This argument is supported by the simple scarcity conflict perspective (Conteh-Morgan, 2004:239). Simple scarcity conflicts are,

> conflicts over scarce renewable resources between states. They are particularly likely to break out over resources that are essential for human survival and can be physically seized or controlled like river water, fisheries and agricultural productive land (Homer-Dixon, 1991:87).

[5] *people who are forced to leave their home region due to sudden or long-term changes to their local environment which compromise their well-being or secure livelihood, such changes are held to include increased droughts, desertification, sea level rise, and disruption of seasonal weather patterns* (Terminski, 2011:1)

According to Homer-Dixon (1999a:228), the word *simple* is used to distinguish this type of conflict from others that include psychological and social processes. Conflicts that include psychological and social processes are those embedded in a context of long-standing religious, cultural or worldview differences and inequalities, and occur mostly within countries rather than between countries (Conteh-Morgan, 2004:239). These may include ethnic clashes arising from social cleavages. For instance, leaders may engage in conflicts to preserve their identity as a leader (fear of losing face) and to encourage group cohesiveness (Libiszewski, 1992:12).

Environmental scarcity causes simple scarcity conflicts and increases society's demands on the state while decreasing its ability to meet those demands (Percival and Homer-Dixon, 1998:281). The simple scarcity conflict argument posits political disputes and violent conflicts between states as occurring when,

> states rationally calculate their interests in a situation where there is a fixed or shrinking pie of natural resources (Homer-Dixon, 1999a:137).

This forces states to seize or claim ownership of a shared renewable resource (Lipschutz, 1989:46).

Understanding the link between environmental scarcity and conflict requires an analysis of the effects and nature of environmental scarcity. Homer-Dixon (1999a:6) suggests that this analysis should rather be questioned in the following manner:

1. Can environmental scarcity contribute to violent conflict?
2. If yes, how can it contribute to violent conflict?
3. Is this contribution important?

2.2.2.1. Demand-induced scarcity: population growth affecting water resources

Demand-induced scarcity is primarily caused by population growth. If a resource base is constant, the availability of resources per person will diminish with the increasing number of people that have to share it. Such scarcity can also arise from an increase in demand per capita (Urdal, 2008:592−3). According to Homer-Dixon (1999a:51), demand-induced scarcity is a result of population size multiplied by per capita demand

for a given resource, and an increase in either population or per capita demand increases total resource demand. For instance, the number of people living in an arid region might go up, which, all other things being equal, will increase total demand for resources such as water for irrigation.

Homer-Dixon (1999a:52) argues that the growing population and greater per capita resource demand can simultaneously boost demand-induced and supply-induced scarcity. For example, increased population size and increased per capita demand for a given resource can have dual effects on environmental scarcity. On the one hand, they both increase the demand for the resource, and on the other hand they can both decrease supply by contributing to resource depletion and degradation (Homer-Dixon, 1999a:52).

According to Homer-Dixon (1999a:48) resource quantity declines due to an increase in demand. Only rivalrous resources can be subject to demand-induced scarcities. For instance, water is a rivalrous resource. Further, a resource is deemed to be rivalrous when its use by one economic actor diminishes its availability for others (Homer-Dixon, 1999a:48; Percival and Homer-Dixon, 1998:280). A demand-induced scarcity results from the water needs of an increasing population, which justifies the demand for increased welfare (van der Molen and Hildering, 2005:134−5).

The demand-induced scarcity argument theorises an increase in demand caused by population growth as fundamental cause of the decline of limited available resources (Bingham, 2001). Both regionally and globally, population growth and rising resource consumption affects resource availability (Homer-Dixon, 1999a:112). Homer-Dixon (1999b:61) argues that as population increases, so will the scarcity of renewable resources. In many cases,

> population growth does not damage the environment, but often this growth, in combination with prevailing social structures and consumption levels makes environmental degradation and depletion worse (Homer-Dixon, 1999a:55).

One of the major challenge as a result of such degradation and depletion relates to water for production to ensure the upkeep of the agricultural and industrial sectors for the benefit, mainly food security, of a rapid population increase (Idule-Amoko,

2009:111). Population growth will lead to over-consumption of resources, resource degradation, and finally scarcities, resulting in violent competition (Binningsbø *et al*, 2007:339).

Human activities have a huge impact on renewable resources. Physical trends that are evident and detrimental to renewable resources include human population, rising energy consumption, global warming, ozone depletion, deforestation, and rising scarcity of fresh water, among others (Homer-Dixon, 1999a:52−3). Rapid population growth is often linked to the emergence of environmental threats (UNEP, 2006:1). This rapid population increase therefore makes the decline of environmental quality inevitable (Urdal, 2005:418). Similarly, the decline of water resources have also been attributed to population growth. Therefore increasing the potential risks posed by this decline and the competition associated with it (Klare, 2001:57).

Due to the lack of sufficient water for growing populations, Africa will be confronted with greater disputes and tensions in the years ahead (Simpkins, 2010). As argued by the resource scarcity perspective, population growth and density may lead to a scarcity of renewable natural resources such as productive land, fresh water, and forests (Weiner and Russell, 2001:3). Roudi-Fahimi *et al* (2002:4) asserts because resource availability is directly impacted by population growth, this makes population growth and important water-related challenge. This is due to water being needed for more than just the basic natural use of human consumption (Roudi-Fahimi *et al*, 2002:4). However, the real challenge lies in the availability of water for large-scale irrigation and food production to feed the people or to obtain revenue from agricultural exports. Therefore, population growth in a country not only increases the demand for domestic water consumption, but also for large quantities of food, which requires considerable amounts of water (Hernandez, 2012:2−3).

In recent years, global human population growth raised alarming concerns over the impact that population growth might have on already fixed and finite water resources. In October 2011, the global human population exceeded 7 billion and it is estimated that by 2025 it will increase to 8 billion (Haub, 2011). Such an increase places further demands on the supply of renewable resources. As demand increases, some countries are already reaching the limits of their water resources. This has been made

worse by phenomena such as El Nino,[6] which has acutely affected sub-Saharan Africa with a decrease in rainfall. Rainfall and river flows in Africa display high levels of variability across a range of spatial and temporal scales, with important consequences for the management of water resource systems (Conway *et al*, 2009:42). As a result, competition for water intensifies between countries. This makes water an increasingly politicised issue (UNEP, 2012:17−18).

Weiner and Russell (2001:3) argue that resource scarcity is assumed to lead to increased intergroup competition and, under unfavourable economic and political conditions, such competition can take the form of violent conflict. Consistently, Goulden and Few (2011:25) found that population growth and density were associated with this increased risks of conflict. According to Kennedy (2001), the scarcity of resources is aggravated by population growth since it produces demand-induced scarcity. This therefore leads to unequal distribution of resources and/or resource capture over shared resources. A comprehensive argument is that, as argued earlier, environmental refugees caused by population growth and resource scarcity will further degrade and deplete available resources. This degradation and depletion of limited resources will lead to intensified competition over remaining resources and subsequently causing conflict (Barnett, 2000:278).

In shared river basins, when the demand for water outstrips available supply, a nation is able to justify military action (whether offensive or defensive) in the name of economic preservation and national security. Population growth may also lay the foundation for conflict in the absence of effective regimes (Van Schaik and Dinnissen, 2014:33). In this study, effective regimes refer to properly functional governance systems such as institutions, agreements and/or treaties meant to contribute to solving international problems. In the instance of environmental problems, this would require functional environmental agreements (Wettestad, 1999: 173; Young, 2011:19854). Rapid population growth and population density are often cited as significant conflict risk factors. The risk for inter-state conflict increases when the reinforcing nature of

[6] *A change in the weather pattern that directly results from the increased warming temperatures of the sea at certain points of the Pacific Ocean (Equatorial Pacific)* (L'Heureux, 2014)

population growth and environmental stresses coincides with the weakening of regimes (Van Schaik and Dinnissen, 2014:33).

2.2.2.2. Supply-induced scarcity: degradation and depletion of water resources

Central to Homer-Dixon and Blitt's (1998:6) analysis of the environment and conflict linkages is the idea that environmental change is only one of three primary sources of renewable resource scarcity. When environmental conflicts break out, it is usually against the background of a number of different factors interacting with one another. A number of scholars have asserted that large-scale human-induced environmental pressures may seriously affect national and international security (Homer-Dixon, 1991:76).

The total effect of human activity on the environment in a particular ecological region is mainly a function of two variables: first, the product of total population in the region and physical activity per capita; and second, the vulnerability of the ecosystem in that region to those particular activities. Activity per capita, in turn, is a function of available physical resources (which include renewable resources such as water, forests and agricultural land) and ideational factors, including institutions (Homer-Dixon, 1991:79).

Kameri-Mbote (2005:2) presupposes that the degradation or depletion of land and water will make a greater contribution to turmoil in the coming decades than will climate change and ozone depletion. Degradation and depletion of resources can increase the risk of conflict in areas where countries that are highly dependent on natural resources are experiencing high rates of deforestation and soil degradation, and in those with low per capita availability of arable land and fresh water (Homer-Dixon, 1999a:53).

We can narrow the scope of this research problem by focusing on how environmental change affects conflict. It may have different causal roles: in some cases, it may be a proximate and powerful cause; in others, it may only be a minor and distant player that involves many political, economic and physical factors (Homer-Dixon, 1991:76).

The decline in resources as a result of unsustainable use is fundamental in causing supply-induced scarcity (Urdal, 2008:593). According to supply-induced scarcity, this decline or drop of a resource means that there has been a decrease in the quality and quantity of the resource (Homer-Dixon, 1999a:48). The supposed decline, which ultimately leads to scarcity refers to an environmental degradation. Environmental degradation reduces the quality and quantity of a limited resource, thereby decreasing the available supply to meet the growing demand (Bingham, 2001).

As part of the environmental degradation argument, the study associates this degradation to the negative impact of nature, human beings and society. This refers to the changes caused by society and nature (i.e. natural variations) to the environment which negatively affects societies (Libiszewski, 1992:4). On Homer-Dixon's environmental scarcity theory similarly argues that the environment may be degraded by causes that are not only caused societies but nature such as natural disasters or less dramatic natural variation. Of the major environmental changes facing humankind, degradation and depletion of agricultural land, forests, water and fish will contribute more to social turmoil in coming decades than will climate change or ozone depletion (Urdal, 2008:593).

Resource depletion and degradation, in conjunction with other two forms of scarcity, influences the emergence of environmental scarcity, as seen earlier. A drop in a key resource can occur as a result of depletion and degradation (Homer-Dixon, 1999a:15).

> Supply-induced scarcity results from rivers running dry, lowered water-tables and polluted groundwater and surface water courses (van der Molen and Hildering, 2005:135).

Because the resource is not allowed to regenerate due to constant degradation and depletion caused by unsustainable use, it simply becomes insufficient. For instance, erosion of land is mostly caused by unsustainable irrigated farming, pastoralism and agricultural practices (Baechler, 1998:69).

Environmental security literature stipulates that the degradation of the environment caused by supply-induced scarcity is seen globally to be a source of civil violence (Homer-Dixon, 1999a:63−77). The main idea, proposed by Homer-Dixon, is that environmental degradation causes resource scarcity which eventually generates

competition and conflict. According to Benjaminsen (2008:819−21), degradation has affected African lands to a point where most of them have been left dry.

In shared water resources, the effects of upstream pollution that ultimately affects downstream countries may also cause countries to fight (Gleick, 1989:336). Water supplies that people depend on are renewable and they regenerate naturally. This means that if their use is adequately sustained, then they can sustain livelihoods for almost indefinitely. However, in areas where institutions meant to preserve the use of water resources are fragile and people depend heavily on these resources for survival, they become depleted quicker than they can replenish (Homer-Dixon, 1999a:13).

Unlike many analysts, the environmental scarcity theory interprets all types of environmental depletion or damage as various forms of scarcity of renewable resources. It views land degradation, climate change and migration as fundamental causes of the increase in the scarcity of land and water resources, and as sources that increase the scarcity of the regular patterns of rainfall and temperature on which communities and states rely (Homer-Dixon, 1999a:9).

2.2.2.2.1. Land degradation

Land degradation can be defined as,

> a long-term loss of ecosystem function and productivity caused by disturbances from which the land cannot recover (George and Cowie, 2011:370).

In literature, the term land degradation is mostly used to describe the process of land losing its fertility, but also to describe situations where land has lost all of its fertility and has, for instance, turned into a desert (Abdi *et al,* 2013:42).

According to Van Schaik and Dinnissen (2014:12), the availability of water, a key resource for survival, can diminish with land degradation and this can pose serious security implications. Although water scarcity and its link to land degradation are increasingly on the political agenda, Van Schaik and Dinnissen (2014:11−31) assumes that land degradation is an underestimated threat and environmental challenge.

They further assert that due to a lack of knowledge and openness, it is difficult to determine the precise magnitude and influence of land degradation on food, water scarcity and conflict risk. This also undermines the sense of urgency to implement concrete measures to counter land degradation. These measures are necessary to tackle negative effects and to stimulate the restoration of degraded lands. Given the widespread and often negative consequences of land degradation, such as migration risks and their implications, several multilateral, national and local initiatives have tried to raise land degradation as an issue of concern (Van Schaik and Dinnissen, 2014:12).

Land degradation is caused by a combination of human activity and non-human factors. Human activities include deforestation and pollution of land and water. These factors are often referred to as bad land management practices and are sometimes related to weak governance, war or other forms of conflict. Non-human factors include rainfall variability, wind and temperature changes. These changes in weather conditions can be related to climate change (WHO, 2017).

Land degradation, through unsustainable agriculture, industry and domestic use are paramount to depletion and degradation of transboundary river basins. Since land degradation reduces people's ability to use land for agricultural production, it potentially reinforces scarcity issues. Land degradation is caused by the long-term unsustainable use of agricultural and forestry land, and/or by the exploitation and poor management of land. In this way, ecosystems lose their functions and both the quality and productivity of agricultural land decrease. The quality of land may also decline because of climate change or local environmental pollution. Subsequently, this may have a negative impact on food supplies and the ability of land to retain water (Van Schaik and Dinnissen, 2014:11−12).

Land degradation is inextricably linked to the quality, volume and timing of water flow in basins. Land degradation can have negative consequences for the availability, quantity and quality of water resources. It decreases the ability of land to capture water at levels accessible to humans (not too deep below the surface) and can contribute to water pollution (if land degradation is caused by pollution). Hence, when land becomes degraded, the availability of (renewable) water is likely to decline, leading to reduced access to drinking water (Baecher *et al*, 2000:73).

Land degradation has become a huge challenge within and between riparian countries (Di Nunzio, 2013:6). Over the years, a considerable number of studies (Libiszewski 1992, Gleditsch 1998, Homer-Dixon 1999a, Turton 2000, Bingham 2001, Urdal 2005, Kameri-Mbote 2005, African Union 2008, Urdal 2008, Tsuma 2011, Ayad 2013, Klare 2013, Van Schaik and Dinnissen 2014) have been published analysing whether, how and the extent to which environmental degradation may cause violent intra- and interstate conflict at local, sub-national and national levels. Under certain circumstances, land degradation may aggravate tensions in society that could lead to violent conflict (Van Schaik and Dinnissen, 2014:31).

Notwithstanding healthy criticism regarding alarmist statements, the relationship between land degradation and conflict does exist. However, this relationship is a complex one and is indirect (Van Schaik and Dinnissen, 2014:11−12). Land degradation is more directly related to conflict risk factors such as population growth, lack of good governance and/or regime capacity, climate change and uneven distribution of shared resources.

2.2.2.2.2. Climate change

With increasing concern about the global effects of climate change which is widely believed to increase environmental scarcities through mechanisms such as sea level rise, drought, and hurricanes, conflict is often invoked as a possible scenario (Binningsbø *et al*, 2007:339). The sharing of international rivers in Africa in the face of climate change might lead to regional security tensions. Climate change simply refers to a change in climate patterns. Such irregular weather patterns, influenced by heavy rainfall in some regions and strong sunshine in others, leads to environmental degradation by lowering the environmental conditions necessary for human survival (Tsuma, 2011:5). Climate change introduces uncertainty in the management and preservation of water resources in that it shifts precipitation patterns and overall water supply (Homer-Dixon, 1999a:67; Homer-Dixon, 2007).

Climate change poses serious security threats, particularly because it is capable of weakening and/or destabilising states and societies through the destructive threat it poses on the political and economic fibres upon which they depend (Saleyhan,

2008:317). As a result, it can make it difficult for states and societies to coordinate activities and adapt, thus creating higher risks of violence (Saleyhan, 2008:318; Tadesse, 2010:7). According to Swain and Krampe (2011:17),

> as per the Intergovernmental Panel on Climate Change (IPCC) findings, two regional patterns are likely for Africa. Northern and southern Africa will become much hotter (minimum plus 4°C) and drier (about 10–20% less rain).

Climate change has moved up the political agenda over the last two decades. This is because it has socioeconomic, political and demographic (through migration) impacts, which many fear will lead to increased tensions and violent conflict (Leroy and Gebresenbet, 2011:9). According to Saleyhan (2008:316), the discussion on the relationship between climate change and conflict is closely related to the discussion on the relationship between resource scarcity and competition over diminishing resources. Since the 1980s, a growing body of research has dealt with the relationship between environmental stress (environmental degradation and resource scarcity) and conflict. More specifically, evidence is mounting that the adverse effects of climate change can, particularly by interacting with a number of other socioeconomic factors, contribute to an increasing potential for conflict (Tanzler *et al*, 2002:4).

During the same period, the issue of climate change increased in importance on the agenda of international environmental politics. This witnessed numerous international processes on climate change being established, such as the Intergovernmental Panel on Climate Change (IPCC) in 1988, the Second World Climate Conference in 1990, and the adoption of the UN Framework Convention on Climate Change (UNFCCC) in 1992. In recent years, climate change has become a major topic in international affairs due to the negotiations of the Kyoto Protocol, which was finalised through the Marrakesh Accords (Tanzler *et al*, 2002:116).

According to Leroy and Gebresenbet (2011:10), the fear and concern of climate-induced conflicts became evident in 2007, when the African Union (AU) and the UN held their first debates on the security implications of climate change. A substantial body of qualitative research tries to establish a link between climate change and conflict. For instance, physical manifestations of climate change may lead to various

socioeconomic and political impacts and, if not well managed, may eventually lead to violent conflict (Leroy and Gebresenbet, 2011:11).

Bronkhorst (2011:31) found that there is already broad consensus that the environment and climate can contribute to conflict, or be an underlying trigger (Bronkhorst, 2011:31). Climate change, one of the factors causing or aggravating land degradation, is often referred to as a *threat multiplier* because it exacerbates existing trends, tensions and instabilities. Given the historical aspect of resource conflicts in Africa, climate change has been able to amply these disputes while simultaneously complicating conflict resolution mechanisms. With already growing limitations and restrictions on water availability in Africa, climate change is expected to worsen this situation (Tadesse, 2010:7−8).

The German Environment Ministry (2002:4) also found,

> the adverse effects of climate change can, particularly by interaction with a number of socio-economic factors, contribute to an increasing potential for conflict.

Similarly, Homer-Dixon (1999a:14) asserts that climate change, in conjunction with other social and resource pressures, can affect societies through reducing available water supplies.

Climate change and its consequences such as floods, droughts and an increase of extreme weather events, may not directly cause conflict but may trigger or aggravate it. The results of droughts and floods will pose regional security challenges in Africa (Swain and Krampe, 2011:17). Fragile and conflict prone states will often be overburdened by the effects of climate change. Countries predicted to be the worst affected by climate change, are also affected or threatened by violence and instability. In these countries, the consequences of climate change are most likely to combine with other possible factors contributing to violent conflict: for example, poverty, bad governance and the legacy of past conflicts all put additional strain on fragile social and political systems (Tadese, 2010:8).

Water is a key adaptation challenge to climate change (Ahmed, 2011:26). During other research focusing on the relationship between climate change and security, scholars

looked at various effects of climate change. Some scholars analysed rain precipitation patterns, while others looked at the effects of climate change on water scarcity and conflict. Climate plays an important role in the evolution of river channel systems (Grainger and Conway, 2014:835). The impact of climate change will have clear bearing on access to shared water resources as it affects hydrological cycles from global to local levels (Swain and Krampe, 2011:17).

Declining water resources and diminishing arable land are already intensifying competition for these resources and creating tensions among displaced populations (Tadese, 2010:8). A third dimension for investigating the climate change/conflict nexus is that of migration. This is because the threats brought by climate change and environmental disasters can perpetuate migration which will ultimately lead to competition between groups, communities and states for available water resources (Saleyhan, 2008:319). For instance, conflict may arise over water resources when forced migration comes in contact with communities and nations who are already struggling to access scarce water resources (Tadesse, 2010:7).

2.2.2.2.3. Migration

Migration can be expected to either aggravate or mitigate the relationship between land degradation and scarcity, thus leading to conflict. Migration is often quoted as a source of conflict, as it increases competition over resources, which may be scarce. The risk of migration increasing tensions is highest when poor people migrate to already poor and unstable countries (Williams and Gemenne, 2016:154).

According to the International Red Cross, by 1999 an estimated 25 million people were reported to have become environmental refugees. 10 years later, the United Nations High Commissioner on Refugees' (UNHCR) projections estimated that this number had increased to 36 million. The UNHCR further reported that climate change had directly and/or indirectly affected an estimated 20 million of these people (Lam, 2012a). According to Lam (2012b), an increase in the number of environmental refugees is anticipated. This number is estimated to grow to 50 million by 2020. Moreover, in the year 2050, the number of environmental refugees is anticipated to triple to 150 million.

According to the United Nations' *International Migration Report* (2015:1), the number of international migrants worldwide was reported to be 173 million in 2000, 222 million in 2010 and 244 million in 2015. 21 million of these migrants are found in Africa, making it the fourth largest host after Europe, Asia and North America respectively.

Migration is motivated by various factors such as economic decline, poverty, natural disasters, floods, land degradation, social unrest or war (Werz and Conley, 2012:4). Water resources have also been deliberately used to foment migration. In Nigeria and Sudan for instance, water resources such as village wells of one group have been bombed, poisoned or polluted by another group dumping bodies in them as a vehicle to influence migration (Kreamer, 2012:89−90).

The link between migration and conflict can be exacerbated by the sudden resource scarcity caused by climate change (extreme weather events) (Werz and Conley, 2012:4). It is very likely that the effects of climate change will contribute to an increase in forced migration. Climate-related migration, due to reduced water availability, may increase the risk of political instability and conflict between different users (Nordas and Gleditsch, 2007:630). Climate migrants are,

> those people who have been displaced, temporarily or permanently, by severe change in climate patterns which have affected the quality of their livelihoods (El-Hinnawi, 1984:4).

2.2.2.3. Structural-induced scarcity: uneven distribution of water resources

The third kind of environmental scarcity is structural scarcity (Homer-Dixon, 1999a:52). In resource capture, demand- and supply-induced scarcities interact to produce structural scarcities (Kameri-Mbote, 2005:2). This scarcity is caused by

> unequal distribution that concentrates a resource in the hands of some groups and subjects the rest to greater than average scarcity (Homer-Dixon, 1999a:52).

This form of scarcity is caused by an uneven resource distribution (Bingham, 2001). Structural-induced scarcity occurs when one group is structurally denied equal access,

through regimes and/or institutions, to a shared key resource by another (UNIFTPA, 2012:9 and 31). This means that scarcity of a resource wouldn't occur if that resource was equally distributed (Urdal, 2008:593). Van der Molen and Hildering (2005:135) argue that more powerful riparian countries usually produce structural scarcity in that they tend to capture disproportionately larger parts of the scarce resource.

This simply means that weaker riparian countries would ultimately get smaller parts of the scarce resource (Homer-Dixon, 1999a:48). This scenario therefore refers to unequal social distribution (Percival and Homer-Dixon, 1998:280). Therefore, the unequal distribution of water has instigated clashes (Kreamer, 2012:90). More so, according to Homer-Dixon (1999a:48) these clashes over access to water may lead to violent conflicts (Homer-Dixon, 1999a:48; Homer-Dixon and Blitt, 1998:6).

Homer-Dixon (1999a:48) asserts that resources should be *excludable* for them to be subject to structural scarcities. An excludable resource is one that can be structurally denied access to through the use of regimes, property rights and/or institutions. For instance, water resources such as transboundary basins can be subject to the assignment of property rights that structurally prevent other actors from accessing water. Disagreements over access and distribution to resources often lead to conflict (Homer-Dixon, 1999a:48). The environmental scarcity theory acknowledges that such disagreements over allocation and use of resources, combined with already existing stress factors increases the likelihood of conflict (UNEP, 2012:14).

Uneven resource distribution often leads to resource scarcity. Such unequal distribution, or what is referred to as structural scarcity, is a key factor in most scarcity-related issues that eventually cause conflict. Often, the imbalance is deeply rooted in institutions (Homer-Dixon, 1999a:15; Purkitt, 2009:62).

Although it can be assumed that enough water is available for current and future needs, water resources are unevenly distributed. Elhance (1999:4) argues that an unequal distribution of fresh water does not in itself necessarily lead to acute interstate conflict, but, *severe scarcities of an essential, non-substitutable, and shared resource* like fresh water may make states prone to conflict. The unequal water distribution has significant implications for society, often causing widespread acute human suffering

and economic damage on a continent where agriculture, largely rain-fed, is the single most important driver of economic growth (UNEP, 2010:15).

It has been reported that cooperative or conflictive events associated with internationally shared water bodies are generally concerned with the allocation and use of water resources. One of the key challenges is allocating shared water resources and their benefits between upstream and downstream countries. Unequal distribution of water affects the quantity of water entering or leaving riparian countries, aside from possible changes due to climate change. Upstream water use would be expected to lead to increased water scarcity in downstream parts of the basin (Munia *et al,* 2016:1−2).

Since the 1990s, much conceptual and theoretical debate has focused on the assumed violent outcome of environmental stress (Gleditsch, 1997; Diehl and Gleditsch, 2001). The Toronto[7] and Zürich-Bern[8] groups produced many empirical insights on the linkages between environmental scarcity, environmental stress and environmental conflict (Tanzler *et al*, 2002:61). However, not all scholars are in support of the arguments and ideas of Homer-Dixon's environmental scarcity theory.

According to Friedrich (2014:80), the connection between environmental pressure and violent conflict has become subject to empirical criticism. Friedrich goes on to argue that there are countervailing arguments that undermine the belief that a strong and significant causal link exists between environmental pressure and violent conflict.

According to Martin (2005:329), an attempt to establish a link between the environment and conflict has become subject to intense debate. Despite advances made by scholarly research, some scholars have emerged whose attention is aimed at criticising the environment-conflict discourse (Martin, 2005:329). Among these critics is Deudney (1990), Levy (1995a: 1995b), Gleditsch (1998), and Martin (2005), to name but a few who, in their work, criticise the Toronto Groups' research on environment-conflict linkages.

[7] led by Thomas Homer-Dixon.
[8] led by Günther Bächler and other scholars from the Swiss Peace Foundation and the Centre for Security Studies and Conflict research.

Several critics of the environmental conflict linkages have argued against the notion that environmental change can affect and/or dictate human behaviour (Coetzee, 2012:2). Furthermore, Levy (1995a:57) asserts that Homer-Dixon's environment-conflict research is *banal advice*, which does not provide for ways in which to intervene, mitigate and/or redress environmental problems. He maintains that policy makers can draw few lessons for preventing or mitigating conflict.

Gleditsch (1998) identifies empirical and theoretical shortcomings of the environment-conflict research and Homer-Dixon's environmental scarcity theory. Despite assertions that a link exists between the environment and conflict, however, Gleditsch (1998:383) argues that scholars fail to agree on the causes of environmental scarcity and its outcomes.

Gleditsch (1998:387) has argued that a problem exists with regards to the theory, conceptualisation and methodology of Homer-Dixon's environmental scarcity approach. He goes on to argue that there are many problems within the environment-conflict literature due to a lack of systematic research on the effects of resource or environmental factors on armed conflict.

Gleditsch (1998:381−5) further uses this criticism as his point of departure, arguing that the environment-conflict research fails to qualify as systematic research (both quantitative and comparative research) since it provides insufficient evidence of this linkage. Moreover, he asserts that little systematic research on the link between environmental scarcity and armed conflict has been conducted.

Gledistch (1998:384) argues that population density and population growth are not measures of either resource scarcity or environmental degradation. He makes reference to Tir and Diehl's (1998) empirical study, which suggests that there is a significant but fairly weak relationship between population growth and interstate militarised conflict and war. According to Gleditsch (1998:384), despite the existence of literature suggesting that a link between population variables and international conflict subsists, there is little theoretical or empirical consensus beyond that. Similarly, Barnett (2000:278−9) argues that despite it being commonplace for population growth to lead to environmental degradation, the manner in which it is

presented lacks proof. As a result, this tends to lead to negative argumentation and assertions.

Gleditsch's (1998:381) argument is based on the grounds of a nine-point critique. This chapter will address the first seven points that best relate to the scope of the study. (Gleditsch, 1998:381) claims that:

1. it is unclear what causes environmental conflicts
2. there is a problematic attempt to link environmental concerns and security
3. researchers overlook the importance of political and economic factors as strong influences on conflict
4. models cannot be tested due their complexity
5. there is a bias case selection
6. the causality of the relationship between environment and conflict is reversed
7. researchers engage in controversial future predictions when arguing for the environment-conflict linkage.

First, according to Gleditsch (1998:387), it is unclear which environmental factors are capable of triggering an environmental conflict. He asserts that clarity and distinction is lacking regarding absolute resource scarcity and/or environmental degradation as capable environmental factors for stimulating environmental conflicts. Gleditsch therefore adopts Stephen Libiszewski's (1992) definition of environmental conflicts and his distinction between conflicts that result from *simple resource scarcity* and those that result from *environmental degradation*.

Libiszewski (1992:2−6) distinguishes these two concepts by arguing,

> simple resource conflicts are very common, but that the concept of environmental conflicts requires a more restricted use.

He defines an environmental conflict as,

> a conflict caused by a human-made disturbance of the normal regeneration rate of a renewal resource.

Gleditsch (1998:387) argues that Homer-Dixon's environmental scarcity terminology fails to distinguish between conflicts that result from simple resource scarcity and those that result from environmental degradation.

Gleditsch (1998:387) further criticises Homer-Dixon's environmental scarcity theory suggesting that the terminology environmental scarcity, which incorporates demand, supply and structural scarcities *muddies the waters.* Critics argue that including distributional issues in defining environmental scarcity makes the concept broad to a point that it becomes useless because conflict solely over resource distribution becomes categorised as environmental conflicts (Schwartz *et al,* 2000:80).

Second, Gleditsch (1998) questions the use of environmental security to highlight environmental concerns on the agenda of national security and international security concerns. He asserts that this does not make environment-conflict research a workable research tool. Similarly, Levy (1995a:55) argues that the entire environment and security literature fails to offer new insight into environmental studies.

According to Gleditsch (1998:388), an attempt to combine environmental concerns and security to form a single entity is misleading in that it does not provide clear theoretical or empirical insight on whether the two objectives are mutually supportive or in competition. This merger is motivated by political rather than research analysis. He further argues that including environmental problems in the concept of environmental security poses conceptual challenges in that the literature engages itself in *conceptual slippage* to prove the futility of the concept of environmental security. As a result, the environment-conflict literature shows theoretical and empirical problems in arguing for environment and security (Gleditsch, 1998:389).

Other critics against linking environmental concerns and national security argue that security is a broad definition, which is conceptually weak to the extent that it is almost vacuous (Gleditsch, 1998:388; Deligiannis, 2010:1). According to Levy (1995b:44), by including diverse threats and problems such as global warming, environmental damage, deforestation, water scarcity and nuclear waste under the term environmental security distorts its meaning since it is not clear about what is included and what is not.

Third, Gleditsch (1998:389) argues that Homer-Dixon's environment scarcity model overlooks important variables such as democracy and regime type. He asserts that in arguing for the potential for conflict in shared river systems, Homer-Dixon (1991, 1994) rarely distinguishes between rivers which run through poor, undemocratic, politically unstable countries ridden by ethnic tensions and rivers running through stable and affluent countries. Gleditsch (1998:389) goes on to argue that Homer-Dixon (1991, 1994) ignores how regime types may influence the occurrence of environmental conflicts.

Here, Gleditsch's (1998:389) argument is twofold. Firstly, he argues that democracies rarely if ever fight one another and rarely experience civil war; therefore, there are no reasons to assume that they will suddenly start fighting over resource issues. Secondly, democracies generally display a more gentle environmental behaviour than non-democracies. As a result, democracies are less likely to generate the kind of extreme environmental degradation that may be assumed to generate violent conflict. Hence, he argues that democracy should have been included in Homer-Dixon's model.

According to Gleditsch (1998:390), highly developed countries have very strong economic motives for not fighting over scarce water resources; instead, they use technology to expand the resources or find cooperative solutions to exploit them. Other arguments for the adaptability of states through the use of technology posit that technological substitutes make up for any resource scarcities or depletion that could lead to conflict, thus making environmental conflict less likely (Deudney, 1990:462-3).

As far as Gleditsch (1998:396) is concerned, conflict in developing countries is a result of social causes such as poverty in contrast to physical causes such as environmental scarcity. He further asserts that physical circumstances of human society are secondary causes of social behaviour and that when it comes to violent conflict they are merely aggravators of already existing social stresses. Gleditsch claims that environmental problems are a consequence of, and endogenous to, the broader social system and that any conflict caused by environmental problems is ultimately caused by social factors.

According to Gleditsch (1998:390), poor countries generate more local environmental problems (environmental degradation like deforestation, lack of water and sanitation, and soil erosion), which, in turn, may exacerbate their poverty and is conducive to conflict. Lonergan (1999:23) asserts that critics argue against the significance of environmentally-induced conflicts, charging that they pose less of a concern to international security since only the poorest countries are likely to experience them. As such, environmental threats to international security are perceived to be minimal.

Fourth, according to Gleditsch (1998:390), Homer-Dixon's (1991, 1994, 1999a and b) environment-conflict models are large and complex to a point where they become virtually untestable. He asserts,

> Homer-Dixon (1991; 1994) employs an overly complex theoretical scheme and models that are not testable....instead of employing complex models, models must be built gradually, with more limited modules being put to the test first (Gleditsch, 1998:390−1).

Fifth, critics argue that cases are selected on the values of a dependent variable (violent conflicts) (Gleditsch, 1998:385). Much of the existing environmental security literature examines the causal linkages between environmental security and violent conflict. However, there have been growing concerns regarding conflicts linked to environmental issues. Since evidence of this linkage comes from case studies, this evidence has been criticised for sample bias. There are claims that cases are selected on values of the dependent and independent variable in that they were characterised by both armed conflict and environmental degradation (Martin, 2005:329). According to Levy (1995a:56),

> Homer-Dixon's case studies offer more anecdotes, but not more understanding.

On the one hand, Gleditsch (1998:385) asserts that environment-conflict research conducted by Homer-Dixon presents itself as a quasi-experimental methodology in contrast to a true experimental method such as randomly selecting cases. On the other hand, Lonergan (1999:24) argues that cases are selected on a developing country sample, thus making the research biased since a majority of these developing countries are susceptible to conflict.

Gleditsch's (1998:391) allegation that *case studies are anecdotal* cannot be easily dismissed because, if cases are only selected on the basis of a certain variable, then the results are likely to favour a desired hypothesis. (Gleditsch (1998:392) claims that this practice produces nothing more than additional false evidence to support the hypotheses.

According to Schwartz *et al* (2000:86), other related objections to selecting cases are that researchers may overlook confounding variables. For instance, environmental scarcity might appear to be the cause of a conflict where, in reality, poverty is the actual cause of changes in both the independent and dependent variable. For instance, Levy (1995a:55) argues that Homer-Dixon's (1991: 1994) selection of case studies is influenced by the occurrence of violence to draw the conclusion that environmental degradation may induce conflict. He suggests that if Homer-Dixon could have compared cases with different violent outcomes in a similar manner, then his conclusions would have been accepted as appropriate.

Sixth, Gleditsch (1998:392−3) raises concerns about the cause and effect relationship, asserting,

> the war-environment relationship is sometimes confused with possibility that environmental degradation causes armed conflict and war.

He argues that researchers often ignore the probability that violent conflict (the dependent variable in most research) contributes to environmental issues (the independent variable) (reverse causality). He claims that environment-conflict researchers have neglected this possibility of reverse causation and have failed to consider the possibility that environmental scarcity and violent conflict are related to each other in this manner or direction. Gleditsch's (1998:393) reverse causation asserts that war leads to an environmental destruction that subsequently leads to resource conflict, thus exacerbating armed conflict.

And lastly, empirical research on environmental degradation or resource depletion and violent conflict has been criticised for its lack of historical evidence to support the hypothesis regarding simple scarcity conflict between states over water (Deudney, 1990:462). Furthermore, Gleditsch (1998:393) claims that the Toronto Group's theory about the links between environmental scarcity and conflict is unfounded in that it is

based on future environmental conflicts. He asserts that Homer-Dixon's (1991, 1994, 1999a and b) assumption of events stressed the potential for violent conflict in the future as empirical evidence.

Similarly, Smil (1997:107) asserts that the environment-conflict literature lacks a historical account that leads to contemporary environmental insecurities. He goes on to argue that cases lack historical contextualisation where environmental degradation has been argued to induce violent conflict. Gleditsch's (1998:394) conclusion is based on the assumption that the theories hypotheses are

> based on controversial theory and debatable extrapolations, rather than data which may confirm the predictions.

He finds these future predictions troubling because in principle, the future may always differ from the past (Gleditsch, 1998:393−4).

Disputes among scholars about how to conceptualise environmental stress have long hindered research on the environment-conflict linkages. The criticisms against Homer-Dixon's environmental scarcity theory can themselves be criticised for failing to take into account the ongoing geophysical turmoil as a result of climate change and the lack of human adaptation to these changes. In view of the widespread nature of human conflict and prevailing pessimism about population growth and environmental destruction, the linkage between environmental scarcity and violent conflict is important and relevant for policy.

As discussed earlier in the chapter, Homer-Dixon addressed the three questions: can environmental scarcity contribute to violent conflict; if the answer is yes, how can it contribute to violent conflict, and is this contribution important?" These questions focused on the assumed causal role stated earlier in the chapter.

Homer-Dixon's environmental scarcity theory adequately guides future research into the relationship between environmental scarcity and conflict through its tripartite definition of environmental scarcity. Therefore, we can see that population growth, in combination with consumption levels, makes environmental degradation and depletion worse (Homer-Dixon, 1999a:55). In response to the criticisms above, this chapter

provides the following seven-point defence of the environmental scarcity theory in the same order.

First, Gleditsch's (1998:387) criticisms focus exclusively on the role that environmental degradation and population growth play in inciting environmental conflicts and ignore other environmental factors such as resource distribution. It is true that environmental degradation as an environmental factor may exacerbate resource conflicts because it reduces the quality and/or quantity of a resource (Gleditsch, 1998:387). Homer-Dixon environmental scarcity theory found that problems of declining resource supply and rising resource demand were always intimately entangled with uneven resource distribution and are environmental factors capable of triggering environmental conflicts (Schwartz *et al,* 2000:80).

According to, the degradation of an environmental resource is only one of two possible sources of a decrease in resource supply.

> Degradation refers to a drop in the quality of the resource, but freshwater for instance can also be depleted, which means the resources' quantity is reduced Schwartz *et al* (2000:79).

If this study limited its scope only to the degradation of environmental resources as a source of conflict, then its analysis of environmental conflicts would be restricted to environmental degradation as the sole source of environmental scarcity.

However, Libiszewski's (1992) distinction between conflicts that result from simple resource scarcity and those that result from environmental degradation, as adopted by Gleditsch (1998), is inadequate because the two categories are not causally separate. Given that linking environmental degradation to violence is, essentially linking the reduction in the resource's supply to violence, it is pointless to omit other sources of resource scarcity from the causality model (Schwartz *et al,* 2000:79).

Homer-Dixon's environmental scarcity theory argues that environmental scarcity is triggered by a combination of population growth and excessive strain on some dwindling renewable resources, exacerbated by unequal access to that resource. The environmental scarcity theory clearly states that population pressure, environmental degradation or unequal access to a resource alone cannot lead to violent outcomes.

However, the theory emphasised the interaction of these factors in the generation of violent conflicts.

The reason for this study supporting Homer-Dixon's environmental scarcity theory is its inclusion of the demand, supply and distributional aspects in its analysis and definition of environmental scarcity. Demand for a resource should be analysed relative to the supply of the resource and the distribution of the resource. It is important to note that the relationships between demand and supply, and between demand and distribution determine people's actual experience of scarcity. Under any practical hypothesis, it is these relationships that influence the probability of violence (Schwartz *et al,* 2000:79)

Gleditsch's (1998) emphasis on environmental degradation alone warps his understanding of the effects of environmental scarcity. His approach tends to neglect key interactions such as resource capture and ecological marginalisation[9] among demand, supply and distribution pressures. As such, his insistence on an exclusive focus on environmental degradation in environment-conflict research unreasonably restricts and distorts the scope of the research and misses crucial aspects of environmental challenges. Hence, it is important to treat environment-conflict analysis through Homer-Dixon's, and the Toronto Group's, incorporation of the three facets of scarcity in the definition of environmental scarcity (Schwartz *et al,* 2000:80).

The one-sided focus on the environment as a source of conflict prevents a more holistic view of the complex interactions between natural resources and human behaviour (Hagmann, 2005:10). Sprinz (1999:183) criticised the Homer-Dixon variables for appearing concurrently as causes and measures of environmental problems, while ENCOP lacks an *ex ante* (based on forecast rather than actual results) formulation of research hypotheses. Rønnfeldt (1997:478) disapproves of the field's tendency to propose

> overly complex models which offer only very general conclusions.

[9] Mentioned earlier in the chapter (see page 36)

Hans *et al* (2000:978) has disapproved of

> the widespread tendency in studies of environmental security to refer to future crisis as empirical evidence.

In reply to Sprinz (1999) and Petter's *et al* (2000) methodological criticisms of their findings, Schwartz *et al* (2001:280) and members of the Toronto Group have argued for a distinction between *causal effect* and *causal mechanism*. In the group's view, experimental and quasi-experimental methods such as multivariate quantitative studies provide indications on causal effect, i.e. changes in probability and/or the value of the dependent variable. Conversely, single-case methods and exploratory case study designs shed light on causal mechanism, i.e. the process and intervening variables producing causal effects (Hagmann, 2005:12).

Second, the question of whether human-induced environmental change should be considered a security threat has been an important part of the post-Cold War debate about redefining security (Deligiannis, 2010:1). According to Hagmann (2005:6), the conceptual development of environmental security as a theme in IR marked the beginning of the environment-conflict school. This symbolised the extension of conventional security thinking to include issues such as environmental change and resources depletion. As discussed in the first chapter, due to resource-based conflicts posing major threats *to* international peace and security, it is essential to expand the concept of security to include environmental concern or protection (Mathews, 1989:162).

Third, Homer-Dixon does integrate regime-type variables in his model and recognises state capacity as an integral aspect of regime type (Schwartz, 2000:82). According to Deligiannis (2010:3), Homer-Dixon hypothesised that environmental scarcities influence the incidence of violent conflict through a series of intermediate social effects discussed earlier in the chapter.

However, even Gleditsch (1998:395) acknowledges,

> under a plausible set of assumption or until a certain degree of democracy is achieved, an increase in the number of democracies is more likely to lead initially to an increase in the frequency of war in the system.

A more explicit focus on democracy could be beneficial to the study and can advance environment-conflict research. However, given the difficult issues surrounding the precise definition of democracy, its use may complicate the research (Schwartz *et al*, 2000:82).

Nonetheless, it is important to note that countries in a certain region sharing a specific transboundary river basin may not qualify as true democracies in that some can either be hybrid regimes[10] or authoritative regimes, while others are characterised by armed conflict and/or lack data to really quantify their system of governance. These forms of governance tend to be unstable or unpredictable, and undoubtedly have poor environmental standards that may influence environmental conflicts (The Economist, 2015).

Gleditsch's (1998) critique seems to be guided by the assumption that the links between environmental scarcity and violence are overstated because humanity shows an astonishing capacity to adapt to scarcities (through technology) (Gleditsch, 1998:383−384, 395). While it is true that technology can allow for the substitution of relatively abundant resources for scarce ones, such technology (desalination plants) is far too expensive, especially for developing countries, which is where a number of transboundary river basins are found (Homer-Dixon, 1999b: 31−5 and 107−32).

Gleditsch fails to acknowledge that societies often cannot adequately adjust to scarcity, or the resultant poverty, migrations and institutional failure. Environmental scarcities have profoundly debilitating effects on some economies, societies and social groups. Therefore, it cannot be inferred that because humans are remarkably adaptive in some cases, they are always adaptive (Schwartz *et al,* 2000:80).

By arguing that environmental conflict is primarily a problem of underdevelopment because *environmental degradation correlates with poverty,* Gleditsch (1998:396) seems to argue that conflict in developing countries is best explained by social causes and not by physical influences of the natural environment. It is true that issues of

[10] *A governing system in which, although elections take place, citizens are cut off from knowledge about the activities of those who exercise real power because of the lack of* civil liberties (Menocal *et al,* 2008:20).

environmental mismanagement are prevalent in politically unstable countries. Needless to say, resource conflicts have a high potential for violence, regardless of the countries' political system or economic orientation (Gleditsch, 1998:389). Gleditsch seems to argue that physical influences of the environment simply aggravate already existing social stress into violent conflict.

It is acknowledged that social variables play a crucial role in human conflict, whether in rich or poor countries. Homer-Dixon and his Toronto Group discussed the political, economic and cultural factors that interact with environmental scarcity to cause violence at length. Societies most vulnerable to environmentally-induced violence are those simultaneously experiencing severe environmental scarcity and various forms of institutional failure, such as failure of states and markets that ultimately hinder social adaptation to the scarcity.

It is therefore essential to acknowledge both social and physical variables in environment-conflict research; but it is most important to note the influence of environmental scarcity on social variables. Homer-Dixon (1999a:17-18) provides three reasons to support this notion. Reason one:, as discussed earlier in the chapter, environmental scarcity is not only influenced by social variables but can itself affect social variables. Reason two: the degree of environmental scarcity a society experiences is not wholly a result of social variables like failed institutions and policies, but also partly a function of the particular physical characteristics of the society's surrounding environment. Reason three: once environmental scarcity becomes irreversible, then the scarcity is almost by definition an external influence on society (Homer-Dixon, 1999a:17−18).

Fourth, Gleditsch's (1998:390−1) assertions regarding *untestable models and complex theoretical schemes* face contradictions. He contends that the environment-conflict literature to date is overly simplistic and simultaneously demands a simplistic model, claiming that Homer-Dixon's models are not testable (Gleditsch, 1998:391). Given that the link between environmental scarcity and conflict is indirect, the model is constrained from omitting variables that correlate to the key independent variable of environmental scarcity (Schwartz *et al*, 2000:86).

According to Martin (2005:330),

> Environmental scarcity acts as an indirect cause of conflict by triggering traditional causes of conflicts such as ethnic differences. Such amplification of existing social fault-lines is associated with institutional failure that is linked to scarcity and poverty.

Homer-Dixon's environmental scarcity theory acknowledges the idea that environmental scarcity alone, also known as the scarcity of renewable resources, is neither a necessary nor sufficient cause of conflicts. Rather a number of contextual factors such as political, economic and social factors play a major role in inciting these types of conflict between states (Homer-Dixon, 1999a:177).

However, the theory also considers that environmental scarcity is a cause of conflict and its influence is typically mediated by these contextual factors. Although many sceptics would conclude that environmental scarcity is not the primary cause of conflict − that there are many contextual factors also involved − the effects and impact of environmental scarcity should not be regarded as unimportant.

Homer-Dixon (1999a:17) makes it very clear that environmental scarcity is not influenced by these factors (e.g. social factors such as failed institutions and policies), but can itself influence and affect these factors. For instance, when environmental scarcity becomes irreversible, the scarcity becomes an influence on society and its actions.

Omitting variables from the model in the name of having *testable models* will only weaken the environment-conflict linkages and research. If environmental scarcity were either a necessary or a sufficient cause of conflict, it would be possible to reduce what Gledistch claims to be a *model complexity* (Gleditsch, 1998:391). Many critics should acknowledge the fact that in order to understand and deal with complex systems, powerful and complex theories are required. The complexity of Homer-Dixon's model captures a number of variables that play a pivotal role in the environmental-conflict linkages.

Fifth, in response to the argued biasness associated with selecting case-studies: it is necessary to select cases based on observed changes in both the independent

variable (environmental scarcity) and the dependent variable (violent conflict) in order to understand whether a causal link exists between environmental scarcity and violent conflict. To do so, Homer-Dixon and the Toronto Group opted to adopt a case study approach in which cases were selected on the basis of observed change in both variables.

Barnett (2000:283) argues that Levy's (1995a) suggestion of comparing different case studies seems problematic in that similar cases cannot be found given the different ecological, cultural and political background of regions and states. In addition, due to Homer-Dixon's (1991:116) area of investigation being how environmentally-induced conflicts occur instead of where they occur, the method of case selection focuses on developing countries that are prone to environmental conflicts. In these areas, institutional capacity to adapt to environmental stress is weak.

Although case studies may be selected on the basis that environmental scarcity and violent conflict are known *a priori* to exist, process-tracing[11] to determine whether environmental scarcity and violent conflict are causally linked is employed. According to Schwartz *et al* (2000:86), the concern that researchers may overlook other variables is misplaced as case-study researchers should detect these situations using theories that are cautious of the other likely causes of change in the value of the dependent variable. The environmental scarcity theory is one such theory that, through its tripartite definition of environmental scarcity, is able to anticipate potential false causal mechanisms.

Sixth, it is undeniable that such reverse causation, where conflict may exacerbate environmental scarcity, exists; however, the environmental scarcity theory did not focus on this possibility. This is evident in the questions and hypotheses raised earlier in this chapter regarding this cause and effect relationship. In addition, the process-tracing applied by the theory with regards to the Orange-Senqu, the Nile and the Niger river basins offers the best method of discovering this causality. Homer-Dixon relies

[11] Process-tracing is a tool of qualitative analysis used to examine and analyse selected evidence by evaluating causal claims in light of research questions and hypotheses posed (Collier, 2011:823)

on process-tracing to identify general patterns of environment-conflict linkages across multiple cases (Homer-Dixon, 1999a:9).

Lastly, Gleditsch's (1998:393) assertions that the Toronto Group uses the *future as evidence* to substantiate its claims of a link between environmental scarcities and conflict, is unfounded. It should be noted that Homer-Dixon's environmental scarcity theory does not posit future crisis as empirical evidence, but as trends. In developing their model and substantiating their theoretical claims, the group undertook a number of detailed historical case studies (Homer-Dixon's, 1991; 1994; 1999a and b). Given the nature of transboundary disputes, the theory included historical accounts informed by literature on the population growth, degradation and depletion, and verbal disputes and agreements between riparian countries in the transboundary basins in question, which helps support claims of a potential future conflict. This is evident in the theoretical application in the chapters that follow.

It is important, as Levy (1995a) noted, that Homer-Dixon's environmental scarcity theory, for the most part, focuses on violence in contrast to security *per se.* Levy (1995a) also noted that Homer-Dixon's (1991, 1994, 1999a and b) work does not emphasise interventionist strategies and/or methods of redressing environmental and developmental problems (Barnett, 2000:283).

Despite a wide variety of criticisms levelled at his work, including a deterministic perspective of Homer-Dixon's causality model and the quality of case studies and untestable models, his research presents a practical empirical attempt to better understand the environment-conflict linkages. Furthermore, his work provides an outstanding platform for further environment-conflict studies.

The importance of the environmental scarcity theory context is that it acknowledges that a number of factors are responsible for the emergence of conflict. Environmental scarcity in combination with these factors therefore drive large migrations, poverty and conflict. (Homer-Dixon, 1999a:13; 17).

An emphasis on the environmental scarcity theory context is important for analysts who often ignore the role played by these contextual factors and, as a result, make

imprecise conclusions. In some instances, their conclusions assume that environmental scarcity is subordinate to these contextual factors (Homer-Dixon, 1999a:17).

Homer-Dixon (1999a:17−18) provides three explanations for this. Firstly, while regimes that govern shared resources influence environmental scarcity, it can itself affect these institutions, policies and agreements in harmful ways. Secondly, the degree of environmental scarcity a society experiences is not exclusively due to economic, political and social factors such as failed institutions, policies and agreements that govern shared resources. It is also partly caused by the physical characteristics of the society depending on that environment. Lastly, once environmental scarcity becomes irreversible, the scarcity is an external factor for society. Even if institutions, policies and agreements attempt or succeed in removing primary causes of the scarcity, because the scarcity has become irremediable it will remain a constant challenge for societies (Homer-Dixon, 1999a:17−18). As a result, the ignorance of the independent causal role of environmental scarcity by policymakers will always affects their recommendations and conclusions (Homer-Dixon, 1999a:18).

As such, this study upholds its support for Homer-Dixon's environmental scarcity theory on the grounds that it maintains a dual understanding of the human-environment relationship. It does this by showing how humans are threatened by the environment and vice versa (Barnett, 2000:285). In support of Homer-Dixon's environmental scarcity theory, this study provides for its theoretical application to the Orange-Senqu, the Nile and the Niger River basins. These case studies illustrate the practical competence of environmental scarcity as a tripartite concept and serve to better the environmental scarcity model and the variables involved in the model.

Homer-Dixon's (1991;1994;1999a and b) analysis of over a dozen case studies to better understand the causal mechanisms that might connect environmental scarcity and conflict enables this study to analyse the Orange-Senqu, the Nile and the Niger river basins within the environment-conflict context. Homer-Dixon's case studies focus on three types of environmentally-induced conflict, i.e. interstate conflict as a result of resource scarcity; subnational or intrastate conflict as a result of population

movements; and subnational or intrastate conflict resulting from environmental stress that exacerbates economic deprivation and disrupts key social institutions. These form part of the Toronto Group's theoretical model about the linkages between environmental scarcity and violent conflict. However, this study will only focus on interstate conflicts induced by resource scarcity. The following section will look at regime theory in explaining the importance of regimes and regime capacity to address environmental scarcity, thus addressing nascent environmental conflicts in shared river basins.

2.3 Regime theory

An important factor for enhancing and addressing both the management and distribution of transboundary river basins is the implementation of institutional support structures. Godana (1985:264) posits that basin states can only gain through the creation of a comprehensive commission serving as an institutional vehicle for cooperation. Moreover, the equitable development of transboundary river basins to requires either an international institutional structure or a negotiated multilateral treaty regime as a bargaining tool between upstream and downstream countries (Okoth-Owiro, 2004:24).

Godana (1985:264) argues that all-inclusive agreements representing the needs and interests of all riparian states is imperative to ensuring that basins develop fully. According to Kukk and Deese (1996:22), river basin organisations are essential as a means for all riparian countries to voice and resolve water issues without resorting to force. Similarly, Hasenclever *et al* (2000:14) notes that regimes may serve as institutional frameworks that facilitate the arrangement of side-payments to improve the relative performance of otherwise dissatisfied actors. Thus, many regimes allow relatively disadvantaged states to voice their concerns about the skewed distribution of gains and to push for correction (Hasenclever *et al*, 2000:14).

Without these organisations, political tensions and disputes along shared rivers tend to emerge (Kukk and Deese, 1996:22). Depletion, degradation, political tensions and disputes emerge in many transboundary basins due to a lack of capacity and capability at the mediating river basin organisation. The organisation is thus unable to ensure

cooperation for the rational planning, conservation and development of resources in the basin as a whole (Godana, 1985:264).

Similarly, the emergence of environmental issues in transboundary river basins is due to unilateral action, which is often ineffective and inefficient. As a result, transboundary cooperation is necessary and is shaped by, and contributes to, the development of transboundary management regimes (Raadgever *et al*, 2008:3).

Okoth-Owiro (2004:25) is of the opinion that establishing an international river basin organisation, authority or commission presents itself as the best solution for preventing and resolving water conflicts. He argues that a river basin organisation is needed to engage water scarce and water rich countries in negotiations. Benvenisti (1996:400) asserts that this allows for collective action so that all riparian countries enjoy access to resources that cross political boundaries.

A prominent factor that determines whether countries and their agricultural systems can respond and/or adapt effectively to rising scarcities of land and water, is institutions. This simply means that if institutions fail, water will not be adequately preserved and agricultural systems will remain grossly inefficient (Homer-Dixon, 1999a:87).

From the 1960s, a growing academic interest in international regimes has culminated in extensive research on regimes, especially on international institutions and their capacity (Young, 1986:104). This section focuses on regime formation, conceptualisation, relevance and effectiveness.

A question often asked is: Can developing countries respond to environmental problems facing transboundary river basins effectively enough to avert these negative environmental effects? Problems within international river basin management have been explained mostly in descriptive ways. This section aims to provide a research framework based on a theoretically guided perspective.

According to Homer-Dixon (1999a:4−5), developing countries will feel the effects and impact of environmental scarcity more than developed countries. Developing

countries' wellbeing is dependent on environmental goods and services, but these countries have little, if any, financial, material and human capital resources to prevent or adapt to environmental scarcities. This leaves their economic and political institutions fragile. The severe stress caused by environmental scarcity can constrain relations between states if the renewable resource in question is a shared resource.

Researchers argue that poor countries are particularly susceptible to resource conflicts as they often lack the capacity to adapt to environmental change. Societies have very different political, financial and administrative capacity to respond adequately to increasing resource demands and such stresses can threaten stability and security. Substantial references to this debate appear in Homer-Dixon (1991; 1994; 1999a and b) and Homer-Dixon and Blitt (1998).

Some experts propose an interstate war may occur as a result of the shift of the balance of power between states, either regionally or globally, as a result of environmental change (Homer-Dixon, 1991:77). Regime-based interstate cooperation is a reality that needs explanation. Africa had established regimes and institutions to achieve cooperation, with river-sharing agreements increasing in the 1990s. However, these agreements are presently under severe stress due to the increasing demand and decreasing supply of water resources. Moreover, the threat of global climate change has raised serious doubts about the future of these agreements (Swain and Krampe, 2011:17).

The politics of transboundary water negotiations between states are complex as a result of the relations among riparian countries in that region (Munia *et al,* 2016:2). The loss of water supplies physically manifests as local and regional problems. What is imperative to consider in the emergence of conflict over water is not particularly the scarcity of water but most importantly its management and/or governance. The absence of regimes or water management policies that are intended to police the use of available water resources given reduced rainfall may negatively affect the provision of water for basic services. And this can contribute to the emergence of tensions and conflict (Abebe, 2009:124).

On an international or inter-state level, environmental stress may trigger international disputes related to interstate conflicts about the access and control of water from rivers, and on obligations under multilateral environmental regimes (Tanzler *et al*, 2002:61). Resource depletion and degradation can influence ideational factors such as prompting or impeding institutional reform. Ideational factors such as institutions help determine the kind of initiatives pursued in a given region or society. They also help determine a region and/or society's vulnerability and adaptability when faced with serious environmental scarcity (Homer-Dixon, 1999a:49−51).

Without a full understanding of regimes and institutions, analysts cannot begin to grasp the nature of the relationship in a given region between human activity and the scarcity of renewable resources, or why regions respond well or badly to this scarcity (Homer-Dixon, 1999a:49−51).

The concepts *regimes* and *institutions* are comparable. They both refer to established rules that govern behaviour (Raadgever, 2005:3). In an attempt to conceptualise regimes and institutions, and find their relevance, a few definitions are provided.

Keohane and Nye (1977:19) both define regimes as,

> sets of governing arrangements that include networks of rules, norms, and procedures that regularize behaviour and control its effects.

According to Hasenclever *et al* (2000:8), regimes are,

> mechanisms that help self-interested states to coordinate their behaviour.

Regimes facilitate cooperation by establishing standards of behaviour that signal to other members that they are in fact cooperating. When all states expect cooperation from the others, the probability of sustaining cooperation increases (Krasner, 1983:2).

However, a widely accepted definition of an international regime is,

> sets of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations (Krasner: 1983:2; Keohane, 1989:3).

According to Lindemann (2009:700−1), water regimes, on the other hand, are,

> treaties on international rivers defined as norm and rule based cooperation for the political resolution of problems and conflict in the field of international river basin management.

It is evident is that key words such as *principles*, *norms*, *rules* and *decision-making procedures* are recurrent in definitions provided by different scholars in an attempt to better explain regimes. Krasner (1983:2), elaborated,

> principles are beliefs of fact, causation, and rectitude. Norms are standards of behaviour defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice.

According to Hasenclever *et al* (2000:7), cooperation makes all participants in a given region better off, but it is hard to achieve the desired cooperation or collective action given the widespread uncertainty that characterises international life.

Regimes can and do reduce this uncertainty among states; they mitigate the fear of cheating or being exploited by the other parties and, thus, make it easier for states to embark on collaborative ventures. In another approach, regimes reduce vulnerability and threats caused by the environment through building the capacity of communities and government to resolve environment-related conflicts. This can be achieved by providing funding and technical expertise or support to address the threat directly (Hasenclever *et al*, 2000:7).

According to Neumayer (2001:122), regime theory is able to address the question of how cooperation can be achieved and sustained in a world divided into sovereign nation-states. In this regard, regime theory is crucial to explaining how regimes create bargaining forums. It presupposes that states are governed by rules and norms (Neumayer, 2001:130−6). Regime theory assumes that when regimes and/or institutions are in place, they are able to mediate between a variety of power and interest variables in a region to produce related behaviour and outcomes in an attempt to foster cooperation in collective security, among other things (Krasner, 1982:189−90).

Regime analysis focuses on patterns of interaction between states. It attempts to explain these relations in terms of principles, norms, rules and decision-making

procedures that arise and become stable as a result of the shared interests of the participants. The proposition of regime theory is that basic causal variables, including egoistic self-interest, political power, norms and principles, usage and custom, and knowledge, give rise to regimes (Thompson, 1991:57).

Regimes are made of two types of institutions worth distinguishing. These includes formal and informal institutions. Formal institutions include law, policy and government bodies, and are explicit and officially announced. International and national law, policy and governmental organisations constitute formal institutions relating to transboundary river basin management. And there are two kinds of formal institutional settings found here, which are, the formal institutional environment (i.e. fundamental political, social and legal rules), and the formal institutional arrangements (i.e. organisational structure for the cooperation and/or competition of members). Law and policy make up the former, whereas governmental organisations make up the latter (Raadgever, 2005:1−4).

Informal institutions include non-governmental actors and cultural norms and values. However, in contrast to formal institutions, informal institutions are not explicit. Their utilisation takes on a more practical form. The similarity however, between formal and informal institutions is that they are both stable and durable. On a transboundary river basin level, they both influence the functioning and effectiveness of water regimes and the efficiency of the water sector (Raadgever, 2005:1−4). According to Tapela (2006:10), the role of NGOs and their participation as stakeholder sin the formulation and implementation of water sector reforms has been generally accepted.

She further argues that the assumption is that broad stakeholder participation contributes towards averting conflicts and fostering cooperation over the often '*scarce'* water resources. The decentralization of water resources management to the sub-state and supra-state levels has therefore seen the involvement of a broader range of '*stakeholders'* in both the regulatory and operational spheres in the region. More recently, there has been a progression from involving local stakeholders primarily in the operational functions of country-specific catchment or basin level institutions towards their involvement in inter-state dialogue (Tapela, 2006:10).

North (1990:3) asserts,

> institutions are the formal rules of the game and are humanly devised constraints that shape interaction.

Institutions are also seen as,

> practices composed of recognised roles coupled with sets of rules or conventions governing relations among the occupants of these roles" (Young, 1986:108).

Institutions have, to varying degrees, rules for monitoring behaviour. By institutions, neo-liberalists mean shared habits and practices of cooperation on the one hand, and fully developed systems of governance on the other (Keohane, 2012:126).

Institutions help establish a network of communication and a platform for exchanging data. The absence of accurate information extensively increases the importance of institutions (Raadgever, 2005:3).

Liberal academics projected institutions as a powerful force for stability and order (Keohane, 1993:53). Keohane (2012:125−6) asserts,

> Institutions and rules can facilitate mutually beneficial cooperation – within and among states.

However, according to Raadgever (2005:3), a common definition of institutions is,

> rules or regularities of behaviour that are generally accepted by members of a social group, that specify behaviour in specific situations, and that are either self-policed or policed by external authority.

Keohane (2012:126) insists,

> The social purpose of Institutional Liberalism is to promote beneficial effects on human security, human welfare and human liberty as a result of a more peaceful, prosperous and free world. Institutional Liberalism justifies the use of power in constructing institutions on the basis of this conception of social purpose.

According to most liberal scholars[12], the main role of institutions is to mediate conflicting interests between states over shared resources in order to achieve cooperation. Mutual interests over shared resources avert tensions and disputes and make cooperation possible. It is only when states realise that institutions and their respective set of rules are beneficial in that they provide a win-win situation that they can cooperate. These theorists believe that institutions can and do have an impact on state behaviour.

The similarities and/or relationships between regimes and institutions are illustrated by Young (1986) in his article *International Regimes*, where he claims that regimes provide states with *roles and responsibilities* in a given region. He further asserts that in understanding the machinery of regimes with regards to roles and responsibilities, international regimes should be viewed as *social institutions*. According to Young (1986:107), social institutions are,

> recognised practices consisting of easily identifiable roles, coupled with collections of rules or conventions governing relations among the occupants of these roles.

He makes a comparison to the roles and responsibilities of *husband and wife in their institution of marriage, buyer and seller in market institutions, owner and non-owner in structures of property rights, and voter and candidate in electoral system* (Young, 1986:107).

According to Young (1986:107), the rules and conventions that grow up around these roles and that constitute the superstructure of social institutions ordinarily encompass sets of rights or entitlements, as well as sets of behavioural prescriptions. In addition, it is not difficult to apply this conception of social institutions to the particular case of international regimes (Young, 1986:107). Similar to regimes, it is evident that institutions matter in the conduct of state behaviour (Keohane and Martin, 1995:40).

It is the responsibility of states to establish and maintain regimes. Despite states' lack of accountability towards maintaining existing regimes, however, they often avoid compromising agreed rules. And a reason behind this is that states firstly consider

[12] Keohane and Nye, 1977; Keohane, 1984, 1989; Axelrod and Keohane, 1985; Haas, Keohane and Levy, 1993; Lipson, 1984; Milner, 1992

efforts and measures taken to construct regimes before they put them at risk. This makes international regimes resilient, because they are economic and political investments (Hasenclever *et al*, 2000:8).

International environmental regimes may contribute to the emergence of an international framework that supports a peaceful settlement of conflicts. Countries that have practiced cooperation on a number of issue areas should be able to resolve problems peacefully in other areas as well. However, Oberthur (2001:244) also cautioned that international environmental policy has only in the rarest cases arrived at a sustained solution to underlying environmental problems. This is due to its structural limits, including the degree of effectiveness and the lack of effective sanctions to counter non-compliance. More effective international environment policies depend less on the specific organisational arrangements and primarily on the political will of countries to grant sovereignty to international bodies and to fully implement the agreements they adhere to domestically (Tanzler *et al,* 2002:63−4).

Both Snidal (1996:127) and Litfin (1997:181f) argue that when international regimes come into existence, they change actors' expectations and the rules of the game, make actors' decisions transparent, initiate further steps and push issues forward. As a result, they start to constrain state behaviour. After regimes have been established, the states that created the regimes are no longer free to do as they please. States get accustomed to cooperation and successful interaction in one regime makes establishing the next one more likely. Snidal (1996:127) and Litfin (1997:181f) maintain that successful regime building induces participating states to develop a collective identity that helps them to sustain cooperation, even in situations where one or the other state would otherwise default.

Regional integration provides a context for peace building, but can also be a catalyst for conflict. This depends on the capacity and/or failure of regimes to mediate differing interests over shared resources (Kameri-Mbote, 2005:7), especially where states belong to several or different regimes because, in most instances, they pursue different agendas. Kameri-Mbote (2005:7) highlights the example of the countries in the Great Lakes Region, which belong to different economic integration bodies. These

include the East African Community, Common Market for Eastern and Southern Africa (COMESA), and South African Development Community (SADC).

Some of these bodies have protocols tailored specifically for environment factors. However, these regional bodies overlap and it is not unusual for neighbouring countries to be members of different regional organisations. For instance, the DRC, Tanzania and Zambia are members of SADC but Rwanda, Burundi and Uganda are not. Further, Tanzania, Uganda and Kenya are members of East African Community, while the DRC, Rwanda and Burundi are not. This assortment can affect or delay the effectiveness of regional bodies in building peace (Kameri-Mbote, 2005:7).

Nonetheless, regimes have a responsibility ensure the overall well-being of the environment. Given that many conflicts have the environment as a source of conflict, regimes must take an active role where environmental resources are related to conflict. Some regimes are successful in addressing environmental conflicts by intervening directly at the threat level. In other words, if water scarcity is identified as the key conflict driver, regimes may employ a number of strategies to address this threat; for instance, by developing an agreement solely based on addressing water scarcity in a given region. In this way, it is possible for cooperation over shared water resources to be a focus around river basins.

On an international level, many multilateral international efforts by environmental regimes and international organisations (UN, UNEP, United Nations Development Program [UNDP]) and international financial organisations and funds (World Bank, Global Environmental Facility) have been established to prevent environmentally-induced conflicts that may have a *general effect of civilizing and stabilizing cooperation* (Tanzler, *et al,* 2002:63).

There is remarkable agreement concerning the reasons for actors in the international community being drawn into regimes or social institutions (Young, 1986:109). Local tensions, local violence and increased regional tensions can, and do, occur over water issues. However, these tensions will likely continue to increase because,

> competition for water exists at all levels and is forecast to increase with demands for water in almost all countries (Gendron and Hoffman, 2009:1).

As a result, a formation governing water regimes in specific regions is required.

On a transboundary level, where a water supply is shared between two or more states, water regimes become an effective tool to promote cooperation over water resources. Such regimes shift the debate away from pure water sharing (natural vs historic rights) to a benefit sharing approach (Earle, 2005:64). According to Al-Din Amer (1997:381), *absolute territorial integrity* (historic rights) *protect(s) the rights of use for the country that puts the water into use first*, therefore giving downstream countries the power to accuse upstream countries of illegally taking measures disadvantageous to their interests. However, *absolute territorial sovereignty* (natural rights) regards water bodies as an integral part of the state's national territory. This principle protects the sovereignty of countries within which watersheds, lakes and rivers originate.

The demand for regime development is also influenced by factors including the actors' deliberate agreement to institutional arrangements through some sort of bargaining process, as long as the marginal benefits of doing so outweigh the marginal costs (Young, 1986:109−110).

It is obvious why states establish regimes. According to Lindemann (2009:701), in transboundary basins, states establish regimes to resolved disputes over allocation, use and development of shared water resources. Water regimes help to ensure governance over shared water resources. For international water regimes to be successful, this depends on two questions. First, what are the leading causes for riparian countries to establish regimes to govern shared water resources? Second, what determines the effectiveness of those institutions?

The issues of regime effectiveness relies on numerous issues. For instance, the determinants of regimes effectiveness evolves around whether or not they are able to address the issues that prompted their creation (Young, 1999:4). According to Lindemann (2009:701) regime effectiveness depends on *behavioural change*. Regime are deemed to be effective if they are able to change the behaviour and converge interests of relevant actors, thus producing better management of the problem.

Lindemann (2009:701) identifies five determinants of water regime formation and effectiveness. These are: problem; process; institutional; country-specific; and international factors.

2.3.1. Problem factors

According to Marty (2001:35−6), there are two types of transboundary-related problems. And these are *transboundary externalities* and *collective problems.* Transboundary externality problems are caused by the upstream-downstream arrangement of transboundary basins. These externalities can be negative and positive.

Negative externalities are when downstream countries' access to water negatively impacts on the developments of upstream countries, they can be subject to cost without compensation. The positive externalities occur less frequently. This occurs in situations where a downstream country for instance, helps upstream countries in providing for flood control and doesn't receive full compensation for such hard work (Marty, 2001:37).

Collective problems, such as floods or common development projects, are caused and/or affect all riparian countries as a collective (Marty, 2001:37).

2.3.2. Process factors

In the formation of regimes, states normally try to reduce costs involved in the formation process by developing certain instruments.. There are two types of costs in this regard: information costs and negotiation costs.

Information costs are related to insecurities that states develop over a specific problem and how other actors may behave in this regard. Negotiation costs often result from poor communication between states over a problem or conflicting interests of states, due to the number of actors involved, that subsequently affect decision-making procedures, As such, measures such as exchange of information can help to reduce information and negotiation costs (Lindemann, 2009:702).

2.3.3. Institutional factors

Numerous factors determine the success of water regimes. Their success depends on their flexibility, feasibility and them being specific. *Specific regimes* are problem-oriented. This means that they must include precise rules for structuring behaviour of actors in a given area so that a problem is addressed adequately. Without these precise rules, resolution of problems becomes impossible, which will in turn have a major impact on the effectiveness of the regime (Lindemann, 2009:702).

Feasible regimes' goals selection depends on the availability of financial and personal resources. They take cognisance of the fact that if financial or personal resources are limited to achieve a certain goal, then this will impact on the effectiveness of the regime. In this regard, for a regime to be effective, it needs to limit its scope of goals (Marty, 2001:47).

Flexible regimes involve the use of institutional tools in order for them to adapt to changes in the nature of the problem. If regimes are not flexible in their problem-solving strategies, they will face difficulties in adapting to changing circumstances, ultimately affecting their effectiveness.

For water regimes to be effective they also need a *centralised organisation structure.* This will enhance and facilitate coordination, communication and monitoring that will, in turn, lead to a more effective regime (Lindemann, 2009:702).

Open regimes encourage and a high degree of public participation. Where non-state actors and civil society are involved in decision-making processes, the available knowledge and legitimacy of the respective regime should increase and, thus, foster its effectiveness (Lindemann, 2009:702).

2.3.4. Country-specific factors

According to Mitchell (2001:13),

> In addition to institutional design, country specific factors also determine regime effectiveness.

This involves the country-specific factors of regime members that influence the effectiveness of regimes (Brown-Weiss and Jacobson, 1998:7). A specific and important feature of regime member countries is capacity (Lindemann, 2009:703).

The capacity of regime member countries to implement the agreed standards and/or impose behavioural change on relevant national actors is very different. Where these capacities are insufficient, the effectiveness of the regime is impaired. Two important and influential capacities of regime member countries that will affect the prospects of a regime are *economic-technological capacities* and *political-institutional capabilities* (Lindemann, 2009:703).

The effectiveness of regimes, particularly water regimes, is impaired by regime members' inability to develop water-related project at a national level due to the lack of enough technical resources meant to produce an exchange of information and implement projects, and administrative and financial resources for the planning and administering of these projects. Additionally, political stability of regime member states is key in improving the effectiveness of these regimes (Lindemann, 2009:703).

2.3.5. Factors of international context

According to Mitchell (2001:12), factors of international context can influence the effectiveness of international regimes. This relates to the bilateral relations between regime member countries as a result of historical and current interactions and conditions, patterns of communication and levels of trust. If bilateral relations are strained by historical or current foreign policy conflict, there is no basis of trust to implement and/or further develop the water regime. Its effectiveness is therefore bound to suffer.

Furthermore, Mitchell (2001:13) asserts that the international organisation are also key in determining the effectiveness of international regimes. This is due to their important role in the fields of expertise, mediation, technical and financial support (Mitchell, 2001:13). This role is mostly evident in developing countries where such support and resources are scarce (Brown-Weiss and Jacobson, 1998:7).

As this section explained regime capacity and its importance in mediating tensions between various stakeholders in shared water resources, the following section establishes the nexus between Homer-Dixon's environmental scarcity theory and regime theory. This will enable a better understanding of environmental threats vis-à-vis regime capacity.

2.4 The relationship between Homer-Dixon's environmental scarcity theory and regime theory

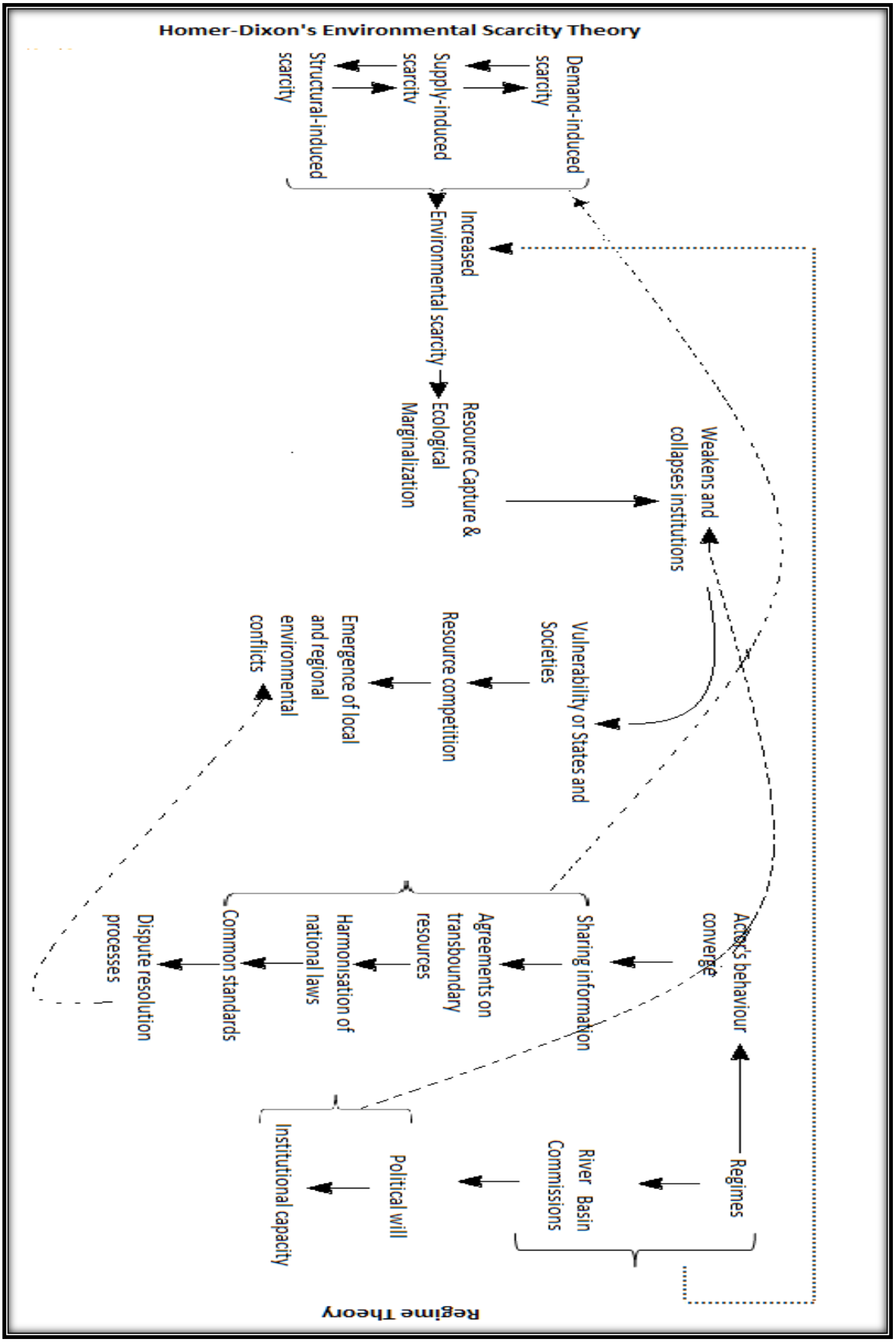
There is a unique relationship between Homer-Dixon's environmental scarcity theory and regime theory (see figure 1 below). These theories respectively explain the impact of environmental scarcity on states and institutions, and the role of institutions in countering environmental pressures on states.

Dotted lines on the figure below symbolise an action in opposition to a previous action. This opposite action addresses, reduces and/or neutralises the previous action. The figure is divided into two sides. The left side of the figure is Homer-Dixon's environmental scarcity theory and illustrates the environmental processes within which localised and regional inter-riparian conflicts over transboundary river basins can emerge.

The right side is regime theory and is counteractive to the left side. It illustrates how the emergence of such conflicts can be avoided, reduced and/or neutralised by forming and using regimes. If regimes are established and backed up by political will, then the threat and impact of environmental scarcity can be avoided. Having regimes, institutions and treaties is not the same as having these regimes resolve specific problems. It is of no value to have regimes if there isn't any political will to pursue certain strategies aimed at specific problems.

An analysis of the left side of the figure shows that transboundary basin cooperation relies heavily on narrowly defined agreements between states, focusing on specific water resource management projects. It also relies on an intense political process of implementing rules and principles of water usage and river basin development by states.

Figure 1: The relationship between Homer-Dixon's environmental scarcity theory and regime theory



Whenever attempting to decipher and understand environmental scarcity, it is of great value to understand and note that environmental scarcity encompasses and/or is a result of demand, supply and structural-induced scarcities, also known as the sources of scarcity (Homer-Dixon, 1999a:8, 177; Homer-Dixon, 1994:8−11). An unregulated population growth, degradation and depletion of resources, and unequal distribution of shared resources, will lead to increased environmental scarcity that can cause severe environmental damage, chronic poverty and violent disputes. Subsequently, this increase in environmental scarcity will give rise to resource capture (very significant in the case of a shared resource) and ecological marginalisation, both caused by the desire to access water resources (Homer-Dixon, 1999a:15). As argued earlier, both resource capture and ecological marginalisation symbolise the interaction and effect of demand, supply and structural-induced scarcities.

Resource capture and ecological marginalisation will expose regimes to issues ranging from an unequal access to shared resources to an influx of environmental refugees and large scale migrants. Many regimes experience a lack of political will to effectively and efficiently carry out strategies aimed at addressing shared problems; poor technological expertise and innovations to address climatic issues; lack of knowledge to adapt to an ever-changing landscape; and a lack of capital to protect resources. With all these challenges, the effects of environmental scarcity will definitely weaken and/or collapse institutions (Deudney, 1990:462−3).

Eventually, this will leave societies and states vulnerable to the impact and pressures of environmental scarcity. As a result, societies and states will fiercely compete for available, yet limited, resources, which will culminate in localised and regional environmental conflicts (as witnessed on figure 1). There are a number of regions in the world where rivers flow through several adjacent nations and the strengths, weaknesses and/or absence of existing regimes between political entities can create tensions (Homer-Dixon, 1999a:17−8).

However, when analysing the right side of figure 1, it is quite evident that there is a reverse or counteractive side. In the face of regional tensions and disputes over shared transboundary resources, states will establish regimes in the form of international river basin commissions, in which transboundary cooperation can be

institutionalised (Dieperink, 1998:472). One of the most important aspects of regimes is norm convergence, which helps states to behave in a common manner, thus making cooperation possible. The general expectation is that cooperation between riparian states will bolster adaptive capacity by allowing them to recognise (through the collection, exchange, and use of data) and respond to (through joint planning and policy implementation) changing circumstances in the basin (Kistin, 2012:41). Regimes serve as rules (formal or informal) that constrain and regulate state behaviour. Norm convergence therefore discourages member states from calculating gains on the basis of self-interest (Jones, 2007).

The likelihood and intensity of disputes decrease as regimes gain the capacity to absorb environmental and institutional change. States will also develop a sense of political will to pursue and implement the aims and objective of these regimes from the fear of possible inter-riparian conflict that may compromise win-win gains.

The political will of regime member countries is imperative to enhancing regime and/or institutional capacity, thus countering the threat of regimes weakening or collapsing. Political will also includes, and relies heavily on, member states financing the regime (Raadgever *et al*, 2008:5). According to Wolf (1998:261), without a good financing system, transboundary river basin management is not viable in the long run. Too much dependence on donors and banks makes management vulnerable.

The political will of regime member states can be measured by their effectiveness to implement policies. To promote effective implementation, policies should be tailored toward the specific interests and resources of the involved parties. Moreover, these policies should be updated periodically to provide an opportunity to adapt objectives and measures to changing conditions (Raadgever *et al*, 2008:3).

An essential aspect, given the presence of regime member countries' political wills, is the development of strategies that focus directly at the threat level. For instance, in the case of disputes over transboundary river basins, this will require the formation of water regimes whose sole responsibility is to address the management and use of shared water resources. Also evident from the right side of figure 1 is that, as soon as regimes are in place, actor's behaviour and expectations will converge. When this

happens, numerous levels of cooperation, confidence-building and joint management will occur, which will also address environmental scarcity.

Firstly, states will be motivated to share information and expertise. Raadgever *et al* (2008:5) argues that the most important requirement for successful international cooperation is mutual trust, which can be achieved and strengthened through information sharing among basin states (Raadgever *et al*, 2008:5). Mutual trust among regime member states also enhances informed decision-making and proper transboundary resource management (Van der Zaag and Savenije, 2000:50). Sharing information is essential to identifying common opportunities and risks to transboundary management, and to structure equitable benefit-sharing arrangements. Sustaining the collection and sharing of information is critical to enabling productive negotiations, reducing uncertainty, and identifying priorities. Information sharing can increase the likelihood that, rather than diverging perceptions or emotions, agreed facts guide decision-making and form the basis of future relationships. It may also help to further de-politicise problems by focusing on technical issues.

Secondly, regime member countries will establish agreements on how the transboundary resource will be shared, managed and/or protected. Such agreements provide an imperative legal framework to regimes. Agreements can be formal, such as treaties, or informal, such as non-binding joint declarations (Bernauer, 2002:3). According to Raadgever *et al* (2008:3), transboundary river basin management can be analysed in terms of the development and implementation of international agreements, such as treaties and protocols.

A diverse range of issues can be covered by transboundary agreements including the specific rights of each party, responsible institutions, enforcement and compliance mechanisms, procedures for monitoring and validating agreed quantities or qualities, and mechanisms for resolving disputes (Raadgever *et al,* 2008:7). According to Earle (2005:56), it is the existence of legal agreements, as well as the legal and institutional capacity to effectively implement cooperation at political levels and enhance political will, which have a direct bearing on the ability of a region to adapt to changing climatic, economic, social and demographic conditions.

Measures for natural variation in the supply of a specific resource, as well as potential risks from climate change and natural hazards, should also be considered. Equitable and adequate resource allocation and management of a shared resource is possible through better cooperation (UNDESA, 2014). While parties may wish to negotiate their own agreements, they could also join multilateral or regional environmental conventions that provide a common framework for all signatory states (Tanzler *et al*, 2002:63).

Thirdly, to effectively and cooperatively counter the threat posed by environmental issues in transboundary river basins, regime member countries will establish institutions and harmonise national laws to implement transboundary agreements. Institutions can range from independent national bodies that coordinate policies to joint institutions that formally receive decision-making power from their respective national governments.

In many cases, both national and local institutions will be required, with strong connections between them and sufficient financing. Countries that are part of a transboundary resource agreement may have to adjust their national policy and legislation to make it compatible with the international policy (Brels *et al,* 2008:13). Even in cases where the transboundary resource agreement already takes existing national structures into account, some level of harmonisation is normally necessary. Earle (2005:56) argues that a basin runs the risk of water scarcity leading to some type of dispute if the joint institutional capacity and legal framework are not in place.

Fourthly, regimes will enable regime member countries to establish common standards to monitor and verify agreed quantities or qualities of shared natural resources. Having common standards, coupled with compatible national laws of all regime member states, will certainly help to address environmental scarcity.

Finally, regimes will enable regime member countries to collectively establish dispute resolution processes. Within any agreement it is inevitable that disputes will arise, whether based on fact, uncertainty, negative environmental impact or inequitable use.

A structured dispute resolution process should be developed and tailored to the specific resource. Dispute resolution processes can be effective if they consist of joint technical bodies/experts and high-level political processes involving national leaders, diplomats and concerned stakeholders. As such, inviting an international tribunal to settle disputes will not be necessary. Nonetheless, watercourse agreements need to concrete, problem-specific and accountable. Moreover, they must include and incorporate detailed resolution mechanisms in cases of disputes (UNDESA, 2014).

2.5 Conclusion

The security implications of environmental scarcity are grave. Understanding the relationship between environmental degradation (caused by rapid population growth, land degradation, climate change, migration and an unequal distribution of resources) and conflict has become a significant challenge (Idule-Amoko, 2009:110). Environment-conflict linkages require careful scrutiny (Goulden and Few 2011:6). Environmental scarcity, if not well managed, will increasingly threaten humanity's shared interests and collective security in many parts of the world. It will also pose a variety of social, political and strategic challenges to many regional organisations.

A growing population and other factors such as a decrease in rainfall and increased use of water for industrial and agricultural production, are likely to contribute to an unequal relationship between water supply, demand and distribution (Pimentel *et al*, 1996). Dissociating one element of environmental scarcity causing change in environmental, social, economic and political realities from other multiple elements that shape and influence regional transboundary basins, remains a challenge. This reflects the underlying analysis that one environmental feature has an impact in combination with other features of the environmental, social, economic and political landscape.

The increasingly negative consequences of the depletion and degradation of land and water resources have influenced academics and governments worldwide to acknowledge the need to minimise the phenomenon and to restore degraded land and watersheds (Van Schaik and Dinnissen, 2014:11). With or without these challenges, it is important that the utilisation, management and sustainability of transboundary

water resources must be done collectively and equitably. It is only through such cooperative efforts that cooperation can be achieved while simultaneously avoiding interstate tension and conflict.

One issue that was quite evident regarding the effectiveness and formation of regimes was that, problem and process factors clearly determine the prospects of regime formation and the last three factors (i.e. institutional factors, country specific factors and factors of international context) determine the effectiveness of regimes.

An important negative social effect of environmental scarcity that regimes should address is the constraint that environmental scarcity imposes on regional economic development such as domestic, agricultural and industrial production (Homer-Dixon, 1999a:88).

Institutions, regimes, agreements, laws and regulations for efficiently and effectively distributing environmental goods and services among states are imperative. The analysis of resources and conflicts requires a thorough understanding of institutions that shape the rules and rights of resource use. Different layers of environmental governance at local, national, and international levels need to be incorporated into the analysis of resource use conflicts. As such, when determining whether regimes and/or institutions matter, researchers need to analyse their significance as determinants of collective behaviour at the international level (Young, 1986:115).

The most important factor to ensuring the long-term sustainable development of water resources remains in the realm of social, economic and institutional development. The focus of cooperation should be on sharing the benefits of the water resource, rather than a strict adherence to sharing the water itself. A move from the top-down management approach towards a participatory system, which links communities that share a resource, is needed. These communities need to be resilient to the drivers of change, such as those brought about through changes in climate and population, by developing networks with other communities. The focus should be on trying to up-scale local cooperation over shared water resources to the national and regional levels.

Whether scarcity problems are resolved peacefully or not depends largely on the effectiveness of governing institutions. Environmental stresses are particularly aggravated when combined with rapid population growth. As the regime weakens, its ability to manage emerging conflict becomes more limited.

Effective climate and environmental policies hold the promise of reducing such potential and serve as tools for conflict prevention and conflict avoidance (Tanzler *et al*, 2002:4). Keohane (1993:53) asserted,

> avoiding conflict depends greatly on institutionalized cooperation.

So far, many conflicts on competing claims for transboundary water resources (both rivers and aquifers) have been solved by negotiations (hydro-diplomacy) and international agreements (both bilateral and multilateral agreements) (Tanzler *et al*, 2002:63).

Good governance is likely to benefit land management practices, food and water policies and economic growth, as well as prevent tension and conflict. Governance is important, as it defines who has the power to make decisions about the ownership, consumption and distribution of resources. Equally so, dysfunctional institutions, or bad governance practices, are considered strong indicators that conflicts will emerge and that environmental stresses will worsen.

A majority of existing institutions governing international rivers are increasingly turning volatile due to the increased demand and decreased supply of fresh water. Adding to the problem is the threat of climate change, which has started to undermine the ongoing regimes and institutions relating to water sharing and the management of international rivers (Swain and Krampe, 2011:17).

According to Idule-Amoko (2009:111), Africa lacks functional regimes (i.e. policy, legal and institutional frameworks) for the management, sustainability and utilisation of transboundary resources (Idule-Amoko, 2009:111). Authors such as Swain and Krampe (2011:21) argue that the existing water-sharing regimes in Africa do not have the capacity to address the emerging challenges that climate change will pose. Most of the ongoing cooperation in international river basins in Africa originated from the active involvement of international donor agencies. Many of these initiatives only

barely survive because of external aid and assistance. Such reliance on minimal external help, alone, exposes the lack of interest and/or capacity of basin states in Africa in creating effective and sustainable management for shared river resources.

Such authors further argue that to address the imminent problems of the existing water crisis and the massive change in the run-off structure due to climate change, the ownership and, most importantly, the accountability of transboundary water management must be restored to the countries in the regions. The role of the international community should be limited as far as regional water-sharing politics is concerned. This will enable and encourage riparian countries to find distinct emancipatory approaches to basin-based river management. These approaches should address the regions' unique cultures and history, as well as their economic disparity and ecological sensitivities (Swain and Krampe, 2011:21).

To sustain and develop the resource that satisfies a basic condition of life will be the biggest challenge for basin states and Africa's transboundary river management processes. The key to transboundary river management for cooperation rather than confrontation will be the smart governance of natural resources, and how politics deals with water issues and emerging threats (Swain and Krampe, 2011:21). Regimes that focus on addressing vulnerabilities and threats caused by the environment may prevent or mitigate conflicts. Given the complexity of conflicts, regimes should avoid focusing on one element of environmental insecurity.

An aspect that features in the arguments of both Homer-Dixon's environmental scarcity theory and regime theory is that the environmental scarcity of renewable resources can indirectly help generate instability, whereas institutions, due to their capacity, often appear to determine cooperation or conflict (Homer-Dixon and Blitt, 1998:223). It is evident from the study that a large number of factors (human and natural causes, and institutions) potentially influence the emergence and continuation of conflicts, and that they are usually interrelated.

In conclusion, the environmental quantity and quality of a country or region can be causally linked to the presence or absence of conflict. It is in this manner that we can

safely and adequately merge Homer-Dixon's environmental scarcity theory and regime theory within the context of transboundary river basins.

CHAPTER 3: THE ORANGE-SENQU RIVER BASIN

3.1 Introduction

Conflicts over water resources appear to be a major source of direct international conflict. The most common environmental elements around which conflicts can erupt are population, water flow, diversion, salinisation, floods, climatic variations and pollution (Schwartz and Singh, 1999:34). Moreover, the institutional capacity to adapt to climatic variability and growing demand is inherent to the emergence of conflict.

The key to adapting to climatic variability, population growth and the construction of large dams lies in the capacity of institutions. Low levels of institutional development have a more difficult time trying to adapt (Earle, 2005: 57). It is also important to note that these key issues influence each other. According to Muller *et al* (2015:103),

> There is a persistent refrain in the shared waters discourse about the danger that conflicts will arise because of competition over scarce water.

However, a substantial number of international river basins are confronted by inherent climatic variability, a natural uneven river flow and a growing demand for water resources as a result of population increase. These types of rivers characterise southern Africa. In addition, the region has a history of political instability, a major factor affecting their institutional capacity to deal with transboundary issues. As a result, southern Africa's transboundary rivers and associated ecosystems could become sources of conflict (Earle, 2005:56).

This has grave significance for the OSRB. Continuously changing patterns of water flow and use in the OSRB are driven by climatic characteristics, population growth, economic development and changing resource management practices (Kistin, 2012:41).

Moreover, the OSRB is characterised by a high economic dependence on local natural resources in the form of agriculture (frequently subsistence) and pastoralism, in which the variability of the climate and the availability of water to a large extent determine

production. This dependence requires a lot of water use and, coupled with unsustainable agricultural practices, often leads to depleted water resources.

The concept of integrated water resources management (IWRM) has been broadly endorsed as a framework for addressing water scarcity and conflict, and as a key to sustainably managing water resources (Kistin, 2010:26).

The IWRM seeks to promote the coordinated development and management of water, land and related resources to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Kistin, 2010:26). According to Hepworth (2009:19) IWRM represents,

> a discursive response to the knowledge that the interconnectedness of the water cycle, particularly at river catchment and aquifer scale, requires that the full range of water uses and their needs be considered together to avoid conflicts and negative impacts and to optimize the benefits of water use.

When analysing the state of hydropolitical vulnerability in southern Africa, Earle (2005:56) suggests that it is essential to look at both sides of the equation, i.e. the underlying factors that create vulnerability to conflict as a response to hydrologic change as well as the legal and institutional response to such change.

According to both Wettestad (1999:173) and Young (2011:19854), instances of environmental change or problems would require functioning regimes. Hence, this chapter will provide an overview of the hydropolitical situation in the OSRB using Homer-Dixon's environmental scarcity theory, and the legal and institutional response to such change using regime theory.

The chapter is divided into four sections. The first section provides a short description of the OSRB.

The second section applies Homer-Dixon's environmental scarcity theory to analyse the impact of population growth on the basin's water resources, the depletion and degradation of the basin's water resources, and the negative impact that uneven water use has on the basin states. Subsequently, this section determines the extent to which

population growth, degradation and depletion, and water use may lead to a nascent environmental conflict in the basin.

The third section of the chapter applies regime theory to analyse the regional and basin-wide regime context of the OSRB. This section analyses the formation of regimes in the region and basin respectively, in an attempt to determine their effectiveness. This section also sheds light on whether regimes in the OSRB are capable of addressing environmental scarcity and avoiding a nascent environmental conflict. The final section of the chapter provides findings and concluding remarks.

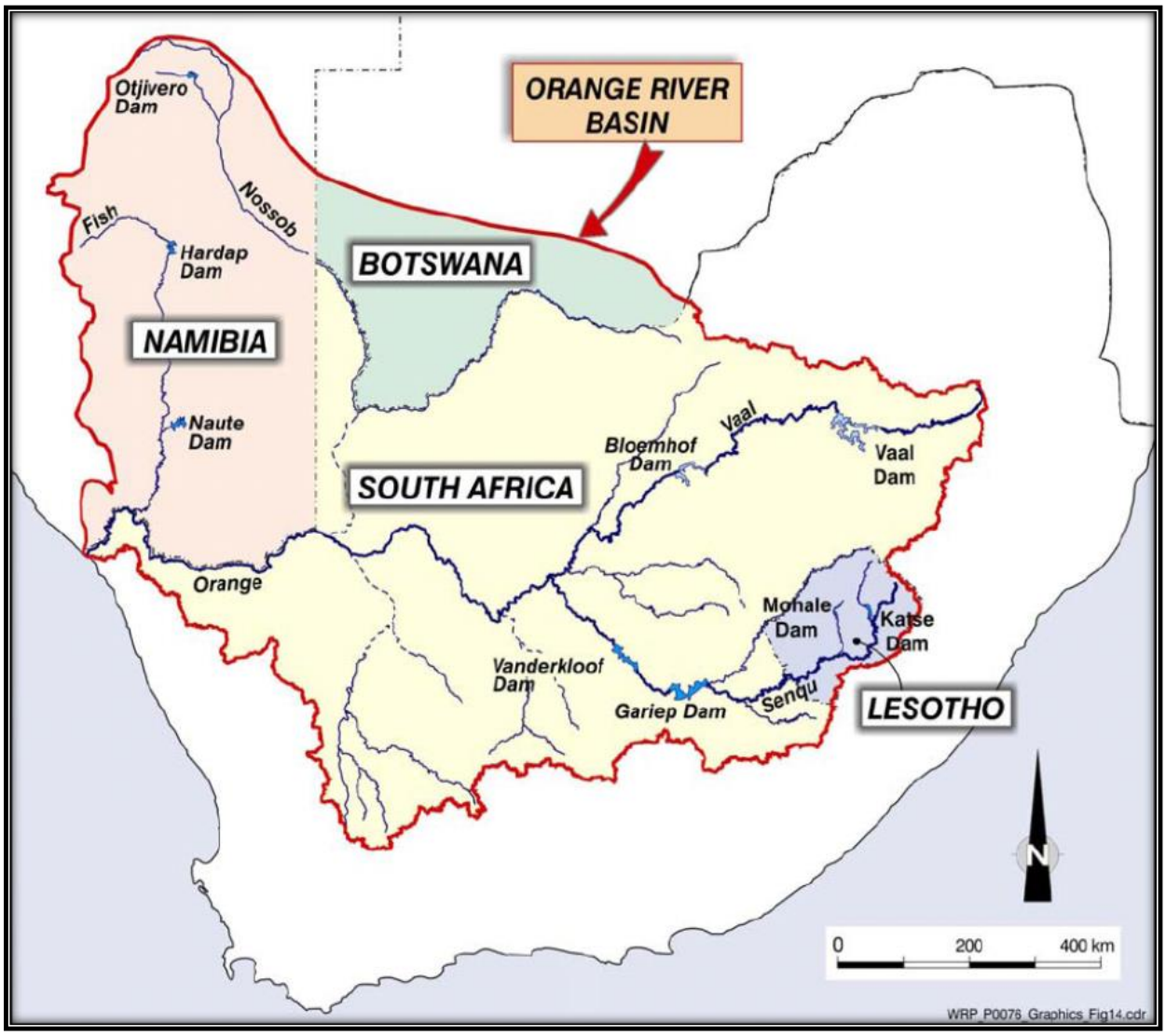
3.2 Description of the Orange-Senqu River Basin

The OSRB is located in southern Africa and extends over four countries (Langea *et al*, 2007:660). These include the Republic of Botswana, Kingdom of Lesotho, Republic of Namibia and Republic of South Africa. The basin rises in the Kingdom of Lesotho and flows westwards for 2,300 km into the Atlantic Ocean (see map 4). The OSRB faces seasonal and spatial water scarcities (Meyer, 2013:28).

Of the river's total flow of 11,300 million cubic metres per year, South Africa withdraws about 63%, making it the largest water user among the Orange River riparian states. Mostly relying on groundwater, downstream Namibia uses only 1.3% of the water and upstream Lesotho, with its plentiful water supply, withdraws a mere 0.2%.

While Botswana is considered an Orange River riparian country due to its hydrological links to the ephemeral Molopo-Nossob tributary, at present it does not use the Orange River surface waters, as there are few inhabitants and little industrial development in its share of the basin (Sullivan, 2014:189)

Map 4: The Orange-Senqu River Basin (Jacobs, 2009:96).



According to the South African Department of Water and Sanitation (DWS) (2016),

> The natural resources of the OSRB are estimated to be in order of 12 000 million m^3/a.

Sullivan (2014:193) provides an indication of the distribution of the OSRB water resources, as well as a comparison of areas and run-off in different parts of the basin (see table 1).

Table 1: Comparing area and run-off in different parts of the Orange River basin

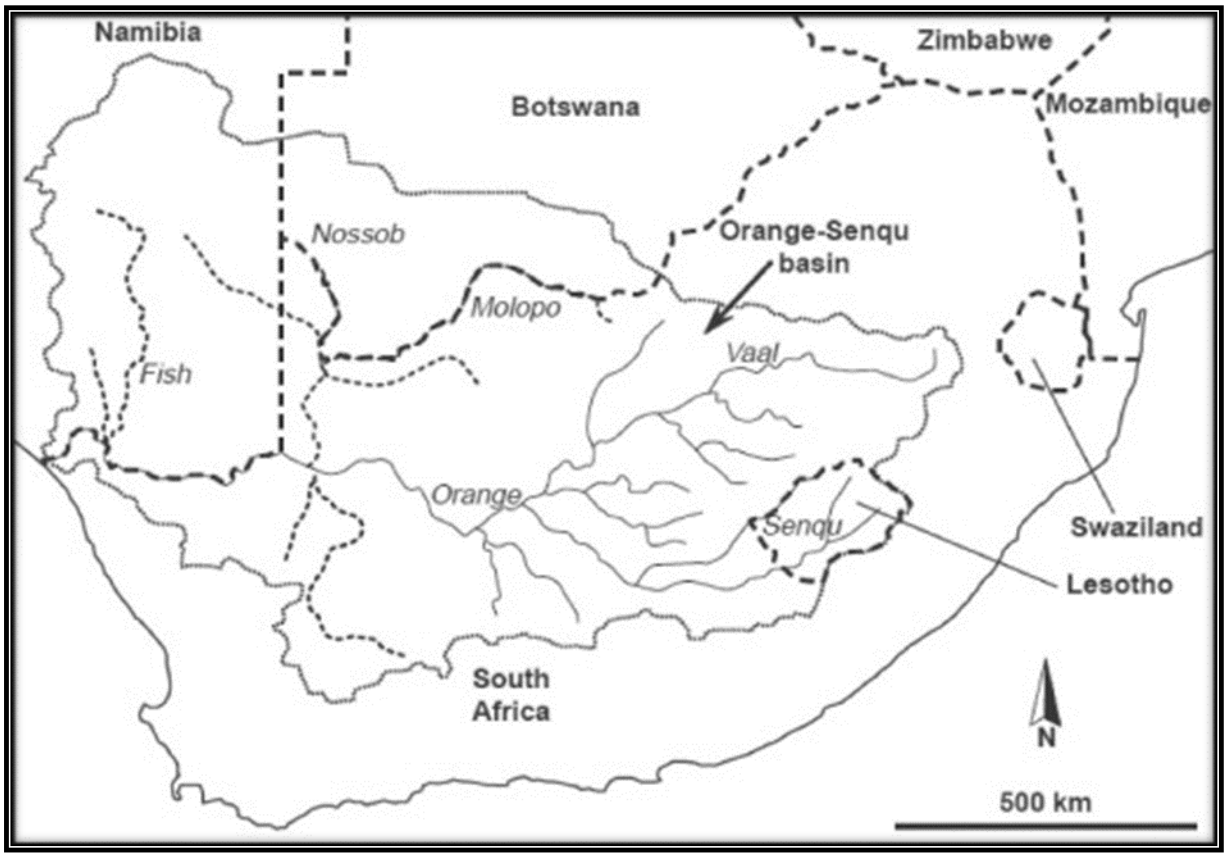
River section/tributary	% of OSRB area	% of total run-off	Run-off per area/ tributary (mn m^3/a)
Vaal River basin	19	36	4,300
Senqu River to Lesotho/SA border	2	34	4,010
Caledon River Welbedacht Dam	2	11	1,240
Orange upstream to confluence with the Vaal	6	11	1,300
Lower Orange excluding Fish River basin	64	4	420
Fish River basin	7	4	480
Total basin	**100**	**100**	**11,750**

Tributaries in the basin include the Caledon and the Vaal rivers (in South Africa), the Fish and the more ephemeral Nossob and Molopo rivers (in Botswana and Namibia); all of these are sizeable rivers in their own right. The Molopo forms the border between Botswana and South Africa; the Caledon forms the northern and western borders between South Africa and Lesotho; and the Orange forms the border between Namibia and South Africa (see map 5) (Sullivan, 2014:190). However, the Orange River's most important tributaries are the Senqu in Lesotho, the Vaal in South Africa and the Fish in Namibia (Wirkus and Böge, 2006:23).

The basin is highly developed, with many dams and transfer schemes harnessing and controlling its flow. The OSRB is one of the most highly developed basins in all of southern Africa, with over 300 built structures ranging from inter-and intra-basin transfer schemes to large dams (Southern Times, 2015). There are approximately 37 large-scale dams (height: over 25m; storage capacity: over 12 million m^3) in the basin, most of them (24) located in South Africa (Wirkus and Böge, 2006:25).

However, being the most developed basin comes with a great deal of consequences. The high number of large-scale dams poses numerous social and environmental challenges. These challenges will be discussed in detail in the following sections of the chapter.

Map 5: Map showing the location and extent of the Orange-Senqu River Basin and the major tributaries in the basin (Kistin, 2012:42)



3.3 Homer-Dixon's environmental scarcity theory: an analysis of environmental scarcity in the Orange-Senqu River Basin

3.3.1. Demand-induced scarcity: population growth affecting water resources in the Orange-Senqu River Basin

A key issue causing hydropolitical vulnerability in the Southern African region is population dynamics that have an impact on water resources (Earle, 2005:60). Homer-Dixon (1999a:112) argues that the challenge population dynamics poses to water resources is not only a regional issue, but a global one as well. According to the demand-induced scarcity argument, population growth leads to an increase in consumption levels of water resources, thus decreasing the amount available to each

individual, group or state (Bingham, 2001). This is evident in the Southern African region. Rapid population growth in southern Africa is affecting the water needs of the region (Earle, 2005:60). According to the latest UN estimates, the current population of southern Africa is 63 million (Worldometers, 2016). Water resources are facing pressing demands from population growth as a result of growing industrialisation and urbanisation (Kranz *et al*, 2005:3).

The increased water demand in southern Africa is driven by high population growth (2-3.5% per annum), urbanisation, improved living conditions, and industrial and agricultural development (Kranz *et al*, 2005:3). Increasing water demand and water use obviously results in less water available per person. A theoretical overview of the link between environment, conflict and population growth points out that the environmental effects of human activity are a function of two factors: the vulnerability of the ecosystem and the product of the total population and that population's physical activity per capita in the region (Homer-Dixon, 1991:85).

As asserted earlier in the study, Homer-Dixon's environmental scarcity theory has argued for the existence of a strong relationship between population growth and environmental conflict. Homer-Dixon's environmental scarcity theory argues that population growth causes environmental scarcity (demand-induced scarcity). Conflict between various environmental users dependent on a specific resource facing depletion and degradation caused by population growth may ensue as a result of such scarcity (Homer-Dixon, 1999b:61). The theory emphasises the notion that population growth and/or population density are often cited as significant conflict risk factors (Homer-Dixon, 1999a:48).

More than 19 million people rely on the OSRB (Southern Times, 2015; INR, 2016). In line with Homer-Dixon's environmental scarcity theory, this chapter argues that a high population growth and a high dependence on water resources can both decrease the supply of water by calling for the increased construction of large dam infrastructure to meet demands and by contributing to resource depletion and degradation through unsustainable use (Homer-Dixon, 1999a:52).

Certain areas of the basin are heavily populated (ORASECOM, 2008:2). The proportion of each country's national population located within the Orange-Senqu basin and relying on its water supplies varies greatly among the states (Kistin, 2010:139). The Vaal catchment is highly populated and urbanised. Similarly, most of South Africa's heavy industry and mining activities are also situated within the catchment (Jacobs, 2009:98).

The DWS stipulated that the demographics of the Vaal river catchment have changed significantly over the years, with increasing numbers concentrated around the urban areas. As a result, the estimated population for the Vaal area[13] is close to 11 million, but the Vaal River system supplies water to a total population of about 20 million (DWS, 2014:6).

Moreover, virtually the entire population of Lesotho, estimated at 2.1 million (Country Meters, 2016), is resident in the basin (Jacobs, 2009:98). Lesotho benefits immensely from significant water resources, but ironically, in the capital Maseru, water stress is becoming an enduring reality largely due to population growth. This population growth is a result of migration from the highlands to the lowlands (Maseru) largely due to the industries found in the capital. This migration translates into an increased water demand. Subsequently, this requires various forms of water transfer, one of which is the Metolong Dam. While the water resources originate in the highlands, however, agricultural opportunities and industrial growth is found in the lowlands (Sullivan, 2014:194−5).

It is conceivable to argue that this growth in population and the density of the population in the OSRB will affect resource availability. Theoretically, this growing population and greater per capita resource demand can lead to increased demand-, supply- and structural-induced scarcities (Homer-Dixon (1999a:52).

[13] Area of land formed by Vereeniging, Vanderbijlpark and Sasolburg - together they comprise a substantial urban complex in South Africa about 60 km south of Johannesburg. Meyerton, just north of Vereeniging, is also generally included in the complex, and residents of Sharpeville, Boipatong, Bophelong, the greater Sebokeng area (including Evaton, Orange Farm, etc.), Heidelberg, Zamdela, and Potchefstroom

When the dependence of a large population on a shared resource increases, that resource will face depletion (as a result of overuse) and degradation (as a result of pollution caused by unsustainable use). Moreover, powerful water users will eventually attempt to capture large portions of the resource (through institutions, agreements and/or plain force) to meet their growing demand, thus structurally denying access to other water users (Homer-Dixon, 1999a:52).

Accordingly, and in line with the arguments of Homer-Dixon's environmental scarcity theory, this increase in population growth will result in two phenomena essential to conflict. Firstly, this growing population will lead to an increase in demand for a resource, which then assumes that the constant use of this resource will result in its depletion (Homer-Dixon, 1999a:48).

Since water resources are rivalrous (when the use of a resource by one group reduces its availability for others), this will result in competition between different water users and lead to disputes and conflict (Percival and Homer-Dixon, 1998:280). Similarly, Van Schaik and Dinnissen (2014:33) contend,

> The risk for inter-state conflict increases when the reinforcing nature of population growth and environmental stresses coincide with the weakening of regimes.

3.3.2. Supply-induced scarcity: degradation and depletion of water resources in the Orange-Senqu River Basin

Water availability in the OSRB is already at a critical stage. When combined with the relatively high water demands and withdrawals for agricultural use, this river basin is among the most severely water scarce river basins in Africa (Diederichs *et al*, 2005:24). Across the entire basin, water stress is widespread (Sullivan, 2014:194). Future projections of the various physiographic, socioeconomic and management data suggest further aggravation of the situation. Being the most developed river in Africa, the Orange River is at present nearly fully exploited for a variety of purposes, and South Africa is the country most dependent on its water (Diederichs *et al,* 2005:24).

The dependence of the OSRB riparian countries on its water for industry (mining and manufacturing), agriculture and domestic uses vary. Accordingly, the basin is degraded and continues to face more challenges from industrial, agricultural and domestic factors (ORASECOM, 2008:2). This situation may lay the foundation for conflict in the absence of effective regimes (properly functional governance systems such as institutions meant to protect and preserve shared natural resources) and coupled with poor political will (i.e. poor financial and personnel commitments, intentions and/or desires to drive political actions) (Young, 2011: 19854).

Increasing population growth, urbanisation, industrialisation, a lack of maintenance of the supply infrastructure such as dams and pipelines, and the anticipated effects of climate change on river flows are some of the geophysical and socioeconomic factors further constraining the OSRB, which is already completely utilised. Mwangi (2008) argues that such man-made environmental degradation poses serious threat to human and environmental security. Similarly, Homer-Dixon's environmental scarcity theory argues that large-scale human-induced environmental pressure may seriously affect national and international security (Homer-Dixon, 1991:76).

Theoretically, Homer-Dixon's environmental scarcity theory contends that the depletion and degradation of resources comes as a result of how the resource is susceptible to changes cause by population growth and resource distribution (Homer-Dixon, 1996:360). In reality, this is true for the OSRB. The OSRB has been depleted and degraded as a result of its vulnerability to natural and human-induced environmental factors such as climate change, industries, agriculture and domestic use. It is also confronted with a rapidly growing population largely dependent on its resources and faces negative consumptive behaviour as a result of large dam infrastructure across the basin and IBTs.

The World Resources Institute's Aqueduct online identified the OSRB as a hot spot of water risk. Droughts and insufficient rainfall contribute to what's known as water risk, along with floods and contamination (Zabarenko, 2011). Most importantly, riparian states in the OSRB are under high levels of water stress. Increasingly, water scarcity limits these states' ability to meet future demands (Sebastian, 2008:147), making tensions and disputes over water resources probable.

Water availability is a main transboundary issue in the region (Jacobs, 2009:98). Water scarcity poses a serious challenge to the basin in view of the climate of the entire basin (Mokorosi, 2007:3). Such scarcity has also placed limits on the future economic growth potential of the region (Earle, 2005:56). Each of the riparian states faces water constraints and relies increasingly on shared international water resources (Langea *et al*, 2007:660). Of the four riparian states of the Orange-Senqu River, three are classified among the driest countries in the Southern African Development Community, i.e. South Africa, Botswana and Namibia (Jacobs, 2009:98−9).

It is estimated that in 2020 water demand will outstrip supply by 93% in the region, and that by 2025 South Africa will face water scarcity,[14] Lesotho will be water stressed,[15] while Botswana is likely to experience water quality and availability problems in the dry season. Although Namibia, the most arid country in the basin, is considered to have adequate supplies of water due to its small population, significant variations exist in supply to populations (Diederichs *et al,* 2005:43).

Despite these estimates, Sullivan (2014:195) notes that Lesotho is not expected to experience either water stress and/or scarcity in the near future given its abundance of water, and its current small water consumption. This means that there is still room to further develop water use for income generation, including electricity (Sullivan, 2014:195). Nonetheless, in this context of shared river basins it can be argued that when the demand for water outstrips available supply, as estimated by Diederichs *et al* (2005:43), a nation will be able to justify military action (whether offensive or defensive) in the name of economic preservation and national security (Van Schaik and Dinnissen, 2014:33).

According to ORASECOM (2008:129),

> the OSRB is one of the most overused basins in southern Africa.

[14] Availability of 1,000 cubic metres per person/year of freshwater, or less
[15] Availability of 1,000-1,700 cubic metres per person/year of freshwater, or less

This is a result of inappropriate management, which has contributed to numerous issues such as:

- a decline in the quality and quantity of water
- reduced land productivity
- high levels of pollution
- a damage to biodiversity

All of these have led to socioeconomic hardships (ORASECOM, 2008:129).

Moreover, the sedimentation problem in the OSRB is caused by natural factors such as easily-eroded sandstone and rainfall, but aggravated by human factors such as a growing population. The sedimentation problem is the worst in South Africa (Burnett, 2009).

Damage to wetlands high in Lesotho's Maluti Mountains posed serious challenges to the quality and quantity of the entire Orange-Senqu River system. With wetlands crucial for retaining, purifying and regulating the flow of water in this high rainfall area, the degradation of the wetlands affects the water supply of the Lesotho Highlands Water Project (LHWP). The LHWP captures water in dams and supplies it to water-thirsty South African industry and agriculture (Burnett, 2009). However, a combination of factors, including infrastructure development, overgrazing and cultivation and the resulting erosion, led to the wetlands being degraded (Burnett, 2009). In addition, the erosion contributed to increased sedimentation of water downstream of the wetlands and, thus, in the Orange-Senqu River system (Burnett, 2009).

All countries within the basin are subject to droughts. South Africa, given its high levels of production and dependence on the Orange River, is the most affected, but has been able to adapt and react to these challenges as a result of IBTs. In spite of the relatively high rainfall, droughts and desertification are also an issue for Lesotho, especially in the southern districts of the country. Botswana and Namibia are, due to their water resources stress, clearly very vulnerable to droughts. However, Namibia, due to its downstream riparian status, is especially vulnerable (Kranz *et al,* 2005:3). With the

current El Nino and/or La Nina events, it is evident that these droughts are expected to persist for some time.

Since Lesotho lies entirely in the basin, the negative human and natural impact on the environment is cause for concern for the entire basin. According to Water Affairs Minister Kimetso Mathaba,

> Massive land degradation in catchment areas is increasingly threatening the sustainability of water, land and related resources. … Although the country was blessed with abundant water resources, these were increasingly threatened by climate change which has been manifested among other things, through the prolonged and recurring El Nino-induced drought (Lesotho Times, 2017).

Rangeland degradation (loss of vegetation cover) is also evident in the OSRB. This loss of vegetation cover has increased the basin's susceptibility to drought thus reducing land productivity. Rangeland degradation is a leading cause of degradation in Lesotho, the southern parts of Namibia and some parts of South Africa.

Two dominating and interconnected factors can result in the loss of vegetation cover. The first is overstocking, which relates to the concentration of animals in a piece of land with limited resources to feed them. And the second factors is overgrazing, which simply refers to the concentration of animals in a piece of land for long periods of time which eventually leads to overuse and depletion. Poor governance mechanisms are additional factors exacerbating overstocking and overgrazing (ORASECOM, 2008:129).

Deforestation is the second key practice of land degradation, and relates to the deduction of woody vegetation cover. Its utmost consequences is a modification of the hydrological cycle. Due to limited woody vegetation cover in Lesotho and along the riparian belt of the middle and lower Orange River, Lesotho has become subject to the effects of deforestation. Wood fuel is still predominantly used as a source of heating and cooking in these parts of the basin (ORASECOM, 2008:129).

Due to the high level of land degradation in the OSRB, potential links between land degradation and conflict seem likely. However, as noted by Van Schaick and Dinnissen (2014:11−12), one should not think of a direct link and/or relationship, but rather of how land degradation is related to conflict-risk factors. While the relationship between land degradation and conflict exists, it is a complex one and is indirect rather than direct.

The OSRB is characterised by the development of industries such as mining, hydro-infrastructure construction such as dams and IBTs. Mining (extraction and processing) is recognised as having a negative impact on the environment, particularly upon water resources (Meyer, 2013:31−2). Sullivan (2014:194) posits that in the Vaal tributary, mining and industry provide the biggest pressures, compounded by the inevitable pollution from growing urban and peri-urban populations. Similarly, in recent years, Lesotho has witnessed developments in the mining sector such as the Letšeng and Liqhobong diamond mines. Although these developments have been good for the country's economy, this development and the potential pollution associated with it will put additional stress on water resources at the local level (Sullivan, 2014:195).

The most frequently mentioned impact of mining is acid mine drainage, which arises when the mineral pyrite comes into contact with oxygenated water. As the rock mass becomes extensively fragmented during mining, the surface area is greatly increased, as is the rate of acid production. The truly detrimental impact of mining arises when large quantities of acidic water are released into the environment, polluting surface and groundwater resources with heavy metals. Lately, the Vaal catchment is considered to be highly polluted, affecting water resource availability for other economic sectors within the basin and the population (Meyer, 2013:31−2).

The construction of large hydropower projects in the basin in response to the growing water demand from agriculture, industry and domestic water use further aggravates the quality and quantity of the basin. The construction of an extremely intricate network of IBTs causes further complications and hydropolitical vulnerability in the basin (Earle, 2005:60). It is sufficient to argue that countries currently developing water resources through hydro-infrastructure construction such as dams and IBTs are doing so in response to pressures from population growth and economic development (Veilleux,

2013:1). However, the challenge is that social and environmental implications on inhabitants associated with these projects are far greater than the hydro power potential expected. For instance, in Lesotho, the construction of huge dams took over people's valleys, homes, fields, gravestones, and grazing lands, all of which were ultimately submerged by water (Bennett, 2012).

Firstly, the challenges posed by the construction of large dams include uneven water distribution for other riparian countries as a result of over-extraction (Diederichs *et al*, 2005:24). Secondly, they include massive displacements. Displacement is commonly associated with refugees fleeing conflict, but millions of people are resettled every year as a result of *development and progress*. Many of these individuals endure social and cultural disruptions as well as economic upheaval, and a significant number never regain their former quality of life. In the 1990s, there was a growing recognition that the vast majority of those displaced by large development projects failed to retain their standards of living. The reality was that most slid into greater impoverishment (Bennett, 2012).

Thirdly, these projects result in the loss of arable land, grazing land and households. For instance, in Lesotho alone, a country with a number of climatic and environmentally-induced challenges, the loss of arable land only made the socioeconomic situation worse. Lesotho lost approximately 2,700 hectares (ha) of grazing land and 925 ha of arable land, with 71 households being displaced and 20,000 people being affected as a result of the construction of the Katse Dam in 1995. Moreover, following the completion of the Mohale Dam in 2007, 1,125 ha of grazing land and 875 ha of arable land was lost, with 325 households displaced in stages 1 and 2 of the project. Seventy-one households also lost over 50% of their land, and 7,400 people were affected (Henwood and Funke, 2002:182; Furlog, 2006:452; Mwangi, 2007:15; Mwangi 2008; Hitchcock, 2015:528).

Due to increasing water scarcity and the predicted levels of water stress to confront certain riparian states, there will be further calls for the construction of dams and ever greater water transfer schemes. Although this can bring a measure of temporary relief (Earle, 2005:60−1), the negative socioeconomic impact of these projects are greater.

With 90% of the LHWP infrastructure located in Lesotho, the environmental and, specifically, the social impact of the project were incurred by that country (Mokorosi, 2007:9). As indicated above, the LHWP resulted in the destruction of arable land and posed a threat to local food security and life dependent on the natural environment, a process termed *ecocide* (Mwangi, 2007:11). As defined by Lee (2001:75), ecocide is the deliberate destruction of the natural environment through various human activities that endanger human life. Ecocide may be the result of externalities such as pollution, which destroy the ecosystem, or of corporations, governments, etc. operating on the indigenous lands using less-than adequate safety procedures (Lee, 2001:75).

According to Muller *et al* (2015:103), the threats to regional integration are that the failure to agree to measures to address scarcity or the impact of upstream activities such as pollution, could promote inter-state conflict. Lee (2001:75) further argues that pollution leads to a situation where the lands, the reproductive ability and the long-term health of the indigenous population are irreparably damaged. Ecocide also results in displaced communities, sometimes referred to as environmental refugees, and environmentally-induced conflicts (Lee, 2001:75).

According to the Transformation Resource Centre (TRC) (2003:3), the destruction of arable land has caused the displacement of large numbers of people (environmental refugees) without compensation from the government of Lesotho. This creates a long line of poverty, which results in a threat to the economic security of Lesotho. The threat to security has occurred despite the existence of the LHWP treaty, specifically article 15 that deals with the regard to be given to social and environmental considerations by the Lesotho Highlands Development Authority (LHDA), which manages the LHWP. Article 15 states,

> The Parties agree to take all reasonable measures to ensure that the implementation, operation and maintenance of the Project are compatible with the protection of the existing quality of the environment and, in particular, shall pay due regard to the maintenance of the welfare of persons and communities immediately affected by the Project.. (Kingdom of Lesotho-RSA, 1986:10).

Exacerbating the issue is the construction of dams across the basin (Heyns, 2004:7).

Most of the OSRB water is used for irrigated agriculture. Agriculture alone accounts for as much as 80% of total water use in the OSRB (Sullivan, 2014:193). In South Africa, for instance, agriculture dominates much of the main stem of the Orange River (Sullivan, 2014:194). The high dependence on local natural resources such as agriculture makes the economies and social character of the OSRB particularly vulnerable to changes in the availability of water over space or time. Such changes may be defined in terms of the total amount of precipitation received, its frequency of recurrence, the persistence of wet or dry day combinations or the onset and duration of the rainy season, or in terms of the quality of the available resource. The extent to which water resources, the environment and economies may be affected by changes in water availability vary.

In South Africa, approximately 800,000 ha of land has been used for irrigation purposes. 300,000 ha of this is situated in the OSRB (Heyns, 2003:21; Heyns, 2004:8). Moreover, domestic and industrial sectors have also caused an increase in water consumption in the basin. And these sectors respectively, including the agricultural sector, are highly responsible for the degradation and depletion of the water quality in the basin

Namibia is the most downstream riparian state with a high reliance on the Orange-Senqu for agricultural activity in the south of the country, even though a relatively small proportion of its population (8.9%) live in the basin's territory. Namibia has an extremely arid hydroclimate, a high level of water stress, and is unique in that all its perennial rivers are transboundary. These characteristics make it particularly vulnerable to external dynamics regarding the river and Namibia therefore relies heavily on international water resources to meet internal demand. Specifically, Namibia relies on South Africa for future water storage developments to increase its assurance of supply. In the southern parts of Namibia, the greatest development potential lies in irrigation, which subsequently creates the highest demand for water (Kranz *et al*., 2005a:3).

For instance, Heyns (2004:7) argued that Namibia's grape production, which is in high demand in both the European and North American markets, has influenced the country's need to expand land to be used for irrigation on the Lower Orange.

> It is clear that the future development of the labour intensive export grape industry is economically viable, but is heavily dependent on the availability of water. (Heyns, 2004:7).

Future irrigation developments will affect the needed supply of water. In this case, the use of *drip (trickle) irrigation systems* may be beneficial.[16]

However, it is not certain that farmers will accept the new method. Servicing the equipment may be problematic and the costs may be high compared to the benefits. Moreover, drip irrigation is sometimes more expensive. This is influenced by various factors that affect the cost such as land size and quality of parts. Similarly, the construction, installation, operation and maintenance (per ha) should also be taken into account (Brouwer *et al*, 2001:59).

As per the Intergovernmental Panel on Climate Change (IPCC) findings, Swain and Krampe (2011:17) indicated,

> Southern Africa will become much hotter (minimum plus 4°C) and drier (about 10-20% less rain).

Climate change is also one of many security threats facing the OSRB. The impact of climate change is likely to exacerbate existing social and political problems that are likely to weaken OSRB riparian member states and societies, thus laying the foundation for conflict. This is due to the existing water scarcity that is further aggravated by the impact of climate change. While the OSRB is characterised by high geographic variability, large agricultural and industrial demands, and historic inequities in supply, the basin is also characterised by natural climatic variability, which is normally characterised by naturally variable rainfall patterns with frequent periods of floods and drought. This is a key issue causing hydropolitical vulnerability (Earle, 2005:60).

Temperature increases and seasonal shifts in the OSRB have had various impacts on the environment and the population. Consequences of seasonal shifts included more

[16] A form of irrigation that saves water and fertiliser by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing and emitters (Brouwer *et al,* 2001:52)

floods during the rainy season and longer dry periods, which affects the water supply of the basin (Meyer, 2013:52−3).

Future predicted effects of climate change will include water scarcity, which affects people´s security; impacts on agriculture due to shifts in seasons, which affects food security; a rise in natural disasters such as field fires, droughts and floods, changes in water run-off and precipitation due to snow melt in the Lesotho highlands; and higher water pollution levels in the dry season (Meyer, 2013:53).

Climate variability in the basin is seen as a natural phenomenon, which varies in space and time. Although to a certain extent people are already used to some climate variability and the consequent impact on livelihoods, climate change is becoming more and more problematic (Meyer, 2013:55).

Declining aggregate rainfall could have a significant impact on agricultural practices, trade and the average quality of life in the basin. In a basin where water supplies are decreasing and where use will likely soon outstrip supply, the effects of global warming could have profound and potentially devastating effects across a range of uses, particularly in the agricultural sector. Observed changes in temperature and precipitation are very likely to change land cover and affect land use patterns in the basin, resulting in shifts in supply and quality of ecosystem services due to altered flow regimes and crop production, biodiversity loss, and increased alien species introductions (Diederichs *et al*, 2005:24).

The hydrological system is likely to see some of the most significant impacts of global climate change (Diederichs *et al*, 2005:72). Some of the adverse impacts of climate change, in combination with a number of political and socioeconomic factors, are likely to contribute to an increasing potential for conflict (German Environment Ministry, 2002:4). Southern Africa, including much of the OSRB, is prone to drought and flooding, and its water resources are highly sensitive to changes in rainfall and other climate variables (Diederichs *et al*, 2005:72). However, these droughts and floods may not directly cause conflict but may trigger or aggravate it by overburdening states and regimes (Tadese, 2010:8; Swain and Krampe, 2011:17).

According to the Krysanova *et al* (2010:4131), the existing disagreements surrounding water allocation in the lower Orange River Basin might be further exacerbated by the impact of climate change. The basin has long experienced substantial seasonal and spatial variation in rainfall and evaporation rates. While annual precipitation at the source of the river (in the Lesotho highlands) is relatively high and evaporation rates are low, the opposite is true for the downstream portions of the basin. Forecasts suggest that the existing spatial variability will be further increased by the impact of climatic change. Especially in downstream areas of the basin precipitation is expected to decrease, and the resulting diminished surface run-off and groundwater recharge are likely to pose serious challenges for maintaining food security and economic development in South Africa and Namibia.

3.3.3. Structural-induced scarcity: uneven distribution of water resources in the Orange-Senqu River Basin

The OSRB is also confronted with the challenges relating to water availability and allocation (Earle *et al*, 2005:13). According to Meyer (2013:30), the scarcity and unequal distribution of freshwater resources in the OSRB is considered one of the fundamental threats to the economic and social development of the Southern African region. According to Sullivan (2014:193−4), South Africa withdraws 63% of the freshwater available in the basin. Namibia's use amounts to only 1.3% of available water in the basin. Lesotho, despite its plentiful supplies, only uses 0.2% of the OSRB's water.

It is important to note that the construction of large dams and IBTs in the region, in response to the growing demand as a result of population growth, has led to further uneven distribution of water and/or water diversions (Earle, 2005:60). An issue that has created uneven water use in the basin relates to South Africa's need for water for much of its urban and particularly industrial demands. Also being the largest basin state, South Africa has had to consume much of the OSRB's waters to support its population. (ORASECOM, 2008:2−3).

South Africa is highly economically dependent on the Orange-Senqu River for a staggering 100% of the GDP of Gauteng, which is the industrial and economic

heartland of South Africa and arguably Africa. As a result, South Africa is dependent on IBTs involving the Orange system (Jacobs, 2009:98−9), therefore consuming approximately 60% more water than other riparian countries, as witnessed earlier in the chapter. Moreover, South Africa may be driven to pursue extensive resource capture (mostly through the use of the LHWP Treaty), considering the future water scarcity estimates of South Africa.

This therefore led to the development of a network of IBTs to link the Vaal with other river basins in order to address Gauteng's water shortages. Gauteng's economic activities are highly dependent on these transfer networks. These developments of IBTs, mostly to cater for Gauteng's water needs, highlight the importance of Gauteng's economic activities to the region. It further highlight the LHWP's importance to South Africa (Turton *et al,* 2004:99).

Lesotho exports water to South Africa at an LHWP Treaty's stipulated rate of 70 cubic metres per second, which literally translates to 4.2 million litres of water per minute (News24, 2016). Due to this water export, Lesotho has become highly dependent on South Africa's royalties for IBTs for its own economic development. With the lowest GDP of all four riparian states, the export of water forms the majority of Lesotho export revenue (Jacobs, 2009:98). However, it is essential to note that regimes such as the LHWP Treaty can, and have, become sources of structural-induced scarcity. This notion is highly supported by Homer-Dixon (1999a:15) who argues that the imbalance of water distribution is often and deeply rooted in regimes and/or institutions.

Although the LHWP is a notable example of interstate political and economic cooperation, it also poses as a possible source of future interstate conflict. Despite Lesotho being a water abundant country, scenarios indicate that the country faces water stress and scarcity as a result of climate change. This creates the potential for future interstate conflict as Lesotho may be unable to supply adequate water to South Africa under the prescribed terms outlined in the LHWP Treaty, as Lesotho will have a pragmatic and moral obligation to first meet its own domestic needs. However, there is a strange aspect to the LHWP Treaty (see Annexure A).

Paragraph 8 of article 6 of the LHWP Treaty states,

> Neither of the parties shall cause or permit under any circumstance nor for any reason whatsoever any unilateral interference with the delivery of water to the Designated Outlet Point.

While all this water is being delivered from the LHWP into the Vaal Dam, more than 70% of all taps in the Kingdom are dry simply due to the lack of good rains that, in most instances, lasts up to about twelve months as a result of El Niño (News24, 2016).

The unfortunate implication of this is that regardless of how long the so-called El Niño may last, and regardless of how often and how much worse its gets, there is no way in which Lesotho can momentarily reduce, let alone stop, the outflow of its water into the Vaal Dam solely to ensure that domestic demand is met first. This situation has given rise to disputes and tensions. Water conflicts between the two riparian states have, arguably, already occurred, despite the current abundance of Lesotho's water (News24, 2016).

Therefore, arguing on the basis of structural-induced scarcity perspective, Lesotho will experience water scarcity, not in the sense of actual scarcity, but in the sense of a lack of full use of the basin. This is simply because the LHWP Treaty put in place to regulate water sharing is perpetuating uneven water distribution. According to Homer-Dixon (1999a:15), resource scarcity is a result of a *severe imbalance in distribution* and is a dominating factor almost every case of scarcity related conflict. He further asserts that, as in the case of Lesotho-South Africa water relations, imbalance in distribution is deeply rooted in institutions

Kreamer's (2012:90) argument that *perceived misallocation of resources has instigated clashes between water users* is also true in the case of Lesotho and South Africa, with reference to the 1986 *water coup* and the 1998 South Africa-led SADC intervention in Lesotho. These events may repeat themselves, although not under the same circumstances, if Lesotho attempts to reduce the flow of water to South Africa, which would be a gross violation of the LHWP Treaty. The government of South Africa may find itself with no option but to respond (News24, 2016).

According to Homer-Dixon (1994:19), on 20 January 1986, South Africa gave decisive assistance to a successful military coup that toppled Lesotho's government. South Africa had numerous reasons for ousting Prime Minister Leabua Jonathan, including the fact that Lesotho had offered sanctuary to African National Congress guerrillas. However, one key motivation is often overlooked: South Africa sought greater access to Lesotho's water supply.

The South African province of Transvaal faced critical water shortages and, despite 30 years of negotiations, the South African government could not reach an agreement with Lesotho for water rights. Within months of the coup, the two governments agreed to the Highlands Water Project, which diverts water from Lesotho's mountainous regions to South African farms and industries. The timing of the agreement suggests a close link between South Africa's involvement in the coup and the dispute over access to water (Homer-Dixon, 1994:19).

Furthermore, as demonstrated by the 1998 South African-led SADC intervention in Lesotho (also referred to as *Operation Boleas* due to the nature and character of the intervention [Neethling, 1999:1]) following political instability as a result of alleged election fraud, it is evident that South Africa’s vested interest in the intervention was water (Bischoff, 2003:196). Although the political instability in Lesotho occurred in Maseru, the South African National Defence Force special troops went to the Katse Dam (211 km from Maseru) and killed 18 Lesotho Defence Force members guarding the dam (Likoti, 2006:166).

Moreover, the OSRB is characterised by historic inequities in supply as a result of border demarcation, water allocation and pricing, subsequently leading to disputes (Shilomboleni, 2006:2). According to Kranz *et al* (2005:3),

> The indisputable facts are that South Africa has most control over the Orange River, and that Namibia is the hardest hit.

As a result, this has constantly led Namibia to question the border arrangement between itself and South Africa, thus intensifying the border dispute. In addition to the common border demarcation that Namibia is contesting, water allocation and pricing, the LHWP has further aggravated the tensions between South Africa and Namibia.

The Orange River forms the border between the South Africa and Namibia. However, there are contentions regarding the border between the two countries (Turton *et al*, 2004:99−100). In 1890, the high-water level along the northern banks of the river was used to determine the boundaries between the two countries, thus leaving Namibia without direct access to the river (Turton *et al*, 2004:99−100).

On the one hand, in terms of the Namibian constitution, Namibia claims,

> The national territory of Namibia shall consist of the whole of the territory recognised by the international community through the organs of the United Nations as Namibia, including the enclave, harbour and port of Walvis Bay, as well as the off-shore islands of Namibia, and its southern boundary shall extend to the middle of the Orange River (Poolman, 2014).

On the other hand, South Africa claims, on the basis of the 1890 treaty, that the border runs along the north bank of the Orange River, and its Recognition of the Independence of Namibia Act denies any recognition of Namibia's claim.

Prior to independence, the then (apartheid) government agreed to consider the demarcation of the borders between the two countries in order to benefit Namibia. This meant that the middle of the river would mark the actual boundary. However, this proposed demarcation never materialised, ultimately sparking disputes over the border (Turton *et al*, 2004:99−100). According to the South West Africa People's Organisation's (SWAPO) Secretary-General Nangolo Mbumba,

> Officials of the Surveyor-General of both countries were involved with the demarcation and the then (apartheid) South African regime agreed that the border between the two countries run through the middle of the river. Both countries have minutes to this affect. It was assumed that this initial arrangement on the Orange River was finalized, but unfortunately no agreement was signed at that stage.

However, the South African African National Congress (ANC) government has a different view on the river, arguing that its northern bank constitutes the border between the two countries. This would mean that Namibia would not have any access to the river or its water (Poolman, 2014).

The assertion by the ANC government and the position of Namibia on this issue could lead to conflict. This is because, according to the structural-induced scarcity perspective, as water resources are *excludable,* meaning that property rights or other institutions can be used to prevent access to the resource by some actors, they are likely to lead to conflict. Renewable resources such as river water have characteristics that permit the assignment of clear property rights. Conflicts over natural resources arise when parties disagree about the ownership, allocation and use of natural resources (Homer-Dixon, 1999a:48).

This is despite a gentlemen's agreement, following South Africa's independence in 1994, reached between the then presidents of Namibia and South Africa, Sam Nujoma and Nelson Mandela respectively. This agreement stipulated that the people living on both sides of the border would have access to the water resources in accordance with international law and the 1995 SADC protocol on shared watercourses, which requires that communities of riparian states have access to common water sources (Poolman, 2014).

Namibian Foreign Affairs Minister Netumbo Nandi-Ndaitwah confirmed that the dispute is still dragging on, irrespective of President Hifikepunye Pohamba discussing the Orange River dispute with his South African counterpart Jacob Zuma during a state visit to Namibia early in 2014. A work group between the two countries has been established to find an amicable solution. Nonetheless, Namibia's Foreign Minister does not seem to be very optimistic that this thorny issue would be solved soon (Poolman, 2014).

Furthermore, at the time of Namibian independence in 1990, it was agreed that Namibia would receive a certain amount of water from existing infrastructure in South Africa to meet its water demands downstream. Namibia would receive this share of water, which it regards as its historical allocation, free of charge. Over the years, however, Namibia has sought to develop its southern region, and the only possibility to promote socioeconomic development in the south would be by using a greater share of the Orange River waters. In particular, Namibia has additional water needs for irrigation (e.g. table grapes for export), mining (e.g. zinc, diamonds), and power generation (e.g. development of the Kudu gas field). To meet these water

requirements, Namibia has asked for an additional temporal allocation of water from South Africa (van Rensburg, 2014:27).

South Africa has responded to this demand by suggesting that any additional water allocations to Namibia should be charged at full cost according to South African water tariffs. Also, South Africa has made clear that the historical allocation taken for granted by Namibia should, in fact, be subjected to operation and maintenance costs incurred by South Africa for water storage and regulating infrastructure on the lower Orange River (Shilomboleni, 2006:11). Currently, Namibia does not have its own water infrastructure on the Orange River and, in the past, has benefited from the South African infrastructure without sharing the burden of its costs. In the future, it is likely that a dam tailored to the needs of Namibia will be built on the lower reaches of the Orange River (Heyns *et al*, 2008:378).

However, further complicating the situation is the expansions of the LHWP, which Namibia fears will reduce water availability in its southern region. In light of these concerns, the Namibian government has made a request to become more involved in phase II of the project. However, South Africa and Lesotho seem to prefer the existing bilateral mechanisms for communication and information-sharing on the LHWP. The primary reasons given for their reluctance to open the LHWP up for greater Namibian participation include the efficiency of bilateral partnerships for project implementation, the complexities of including additional states, and the belief that existing mechanisms in the basin, especially ORASECOM, provide sufficient possibilities for Namibian involvement (Kistin and Ashton, 2008:397).

3.4 Regime Theory: An analysis of regime formation and capacity in the Orange-Senqu River Basin

According to the DWS (2015), water resources are not only becoming increasingly limited as economies and populations grow, but rainfall is highly variable and unevenly spread across the region. Frequent droughts, often broken by severe flooding, have affected lives, slowed economic growth and posed significant problems for water managers. Intensive use of limited water resources has affected their quality and had an impact on downstream river ecosystems. Climate change and variability may

further exacerbate these problems. Therefore, there is a need for increasingly close cooperation among nations that share river courses in order to continue to grow our economies, address poverty and protect the environment (DWS, 2015).

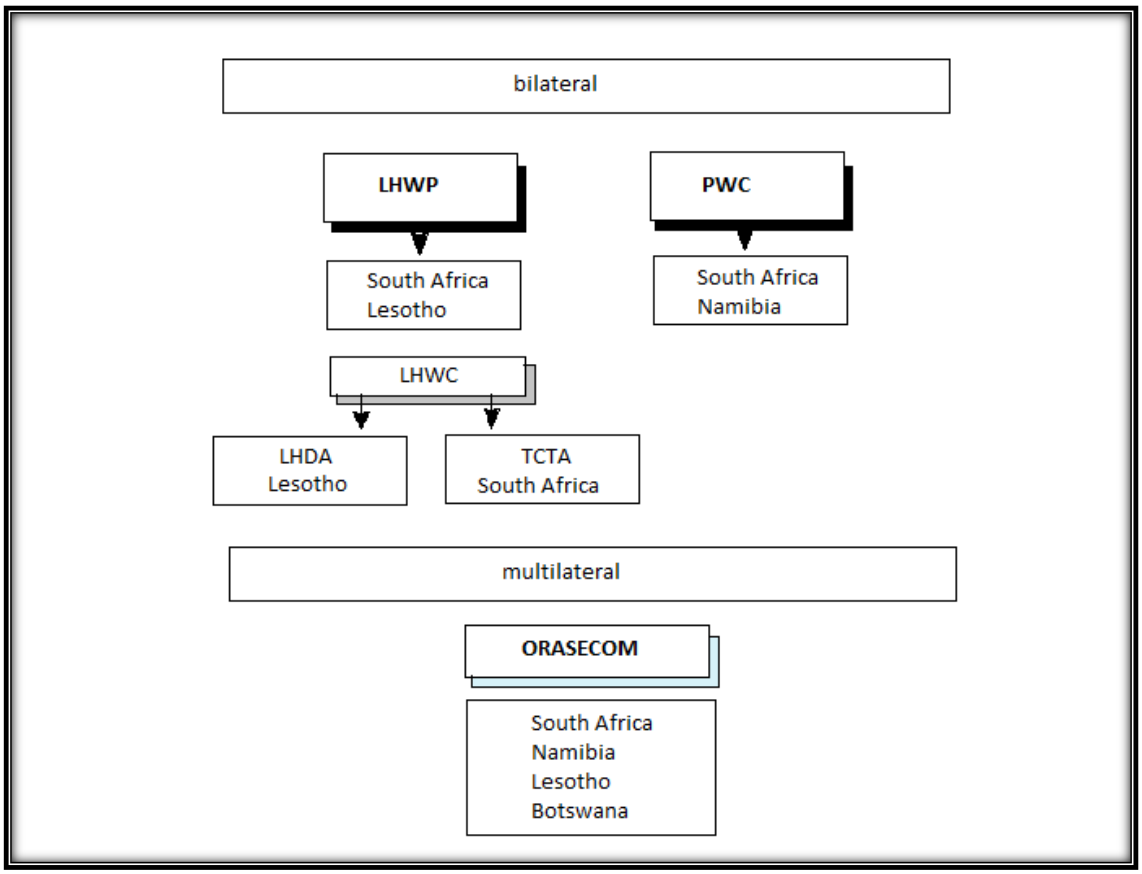
Water scarcity in transboundary basins can constrain the economic and social development of the dynamic and growing economy in basins, thus leading to disputes and tensions that make adequate water resource management necessary. Institutional capacity, be it in the form of river basin commissions and regional water structures, defined as a legal framework in the form of formal treaties and protocols, or technical cooperation in the form of informal working groups and technical task teams or generally warm relations, has been prioritised as the heart of conflict management, particularly in arid countries (Wolf, 2005:13).

An obvious way for states to cooperate over the management of shared waters is by negotiating international agreements (Hiddema and Erasmus, 2007:2), which does not encroach on the sovereignty of states and allows them to reconcile national legal and jurisdictional aspects with regional legal and jurisdictional infrastructure (Kistin, 2012:42). As regime theory itself argues in favour of respect for state sovereignty in matters relating to shared water resources, this chapter can assume that regimes are indeed essential tools for reducing uncertainty and mitigating the fear of exploitation among riparian countries (Hasenclever *et al,* 2000:7).

River basin organisations are at the core of the IWRM, with the mandate of building consensus and harmonising local, regional and national water policies. Effective water governance relies on national laws and institutions at the national, provincial and local levels.

The OSRB is characterised by a rich history of interstate interaction over water resources and a multiplicity of international water management institutions that have emerged and evolved over time (see figure 2) (Kistin, 2012:42). According to Jacobs (2009:100−1), negotiations over the waters of the OSRB have been ongoing between various combinations of the riparian states since the 1950s, which has resulted in a wide range of bilateral and multilateral inter-state/government-led commissions and agreements, project-based organisations, treaties, and technical committees.

Figure 2: Overview of the Orange-Senqu basin governing institutions (Kistin, 2012:24)



This cooperative framework has, to a large extent, been determined by the hydropolitical history of riparian relations and the domestic context of national regime types. In addition, an international policy and legislative framework exists, which guides policy formulation at the basin and national levels (Jacobs, 2009:100−1).

The most significant regional and basin-wide legal instruments for the OSRB include the 2000 Southern African Development Community (SADC) Revised Protocol on Shared Watercourses, bilateral agreements established between the four OSRB riparian states and one multilateral basin-wide treaty (Jacobs, 2009:114; Kistin, 2012:42). Raadgever *et al* (2008:10) argues that supporting regional and basin-wide regimes and legal frameworks in the basin in includes the SADC revised protocol and ORASECOM. More so, there are other regimes at the basin and national levels consists primarily of ORASECOM and other bilateral agreements which will we mentioned in detail below.

According to Kistin and Ashton (2008:391) and Kistin (2012:42), bilateral agreements relevant to the current management of the basin include:

- The 1986 bilateral treaty between South Africa and Lesotho, providing a framework for the LHWP and the establishment of the Joint Permanent Technical Commission (JPTC), referred to today as the Lesotho Highlands Water Commission (LHWC)
- The 1992 bilateral agreement to establish the Vioolsdrift and Noordoewer Joint Irrigation Scheme (VNJIS) and the Joint Irrigation Authority (JIA) between South Africa and Namibia
- The 1992 bilateral agreement between South Africa and Namibia that resulted in the establishment of the Permanent Water Commission (PWC)
- The 2000 multilateral agreement establishing ORASECOM between all four riparian states.

The 1986 LHWP treaty, a key bilateral agreement between South Africa and Lesotho, is a project-based treaty and establishes provisions to construct and manage the LHWP. Similarly, the 1992 VNJIS agreement addresses the planning, operation and maintenance of joint projects in the basin specific to the VNJIS. Additionally, it dedicates 20 million m^3 annually to the scheme, with 11 million m^3 going to farmers in South Africa and 9 million m^3 designated for those in Namibia. The agreements establishing the PWC and ORASECOM create joint institutions to advise parties on the development and use of shared waters. (Kistin and Ashton, 2008: 391-3; Kistin, 2012:42).

In terms of institutional responsibility, the project-related institutions, the LHWC and the JIA, are granted substantial powers to design and carry out policies and procedures relating to the investigation, negotiation and recommendation to parties regarding water allocation. The two commissions, i.e. the PWC and ORASECOM, serve as advisory bodies whose mandates are wider in scope than the project-based institutions and were specifically designed with an advisory function to parties on *such matters as may be determined* by the parties (Kistin and Ashton, 2008: 396).

3.4.1. Regional context

Water in the region is a scarce resource. It is foreseen that in the next 20 to 30 years, three or four SADC states will be facing serious water shortages. As a result of this estimation and in recognition of the importance of a coordinated approach to the use and preservation of water, SADC member states initiated and signed the *SADC Protocol on Shared Watercourse Systems* (Muller *et al*, 2015:51). The protocol was signed at the 1995 summit in South Africa and came into force on 29 Septemebr 1998, when two-thirds of the original SADC member states had ratified it (SADC, 2000: Article 16.1; Mbaiwa 2004: 1323).

However, in Windhoek on 7 August 2000, the protocol was revised and came into force in October 2003, after Tanzania became the ninth member state to ratify it. Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe are all signatories to the protocol (SADC, 2000:17; Solomon, 2014:89). The revised SADC protocol is aligned to the 1997 United Nations Convention on Law of the Non-Navigational Uses of International Watercourses (see Annexure B). This is reflected in the preamble of the protocol, which states that the protocol bears,

> in mind the progress with the development and codification of international water law initiated by the Helsinki Rules and that the United Nations subsequently adopted the United Nations Convention on Law of the Non-Navigational Uses of International Watercourses (SADC, 2000:1).

This serves to align the regional protocol with internationally accepted norms on shared watercourses (Furlong, 2006:448). Some of the key objectives of the protocol is the harmonisation of transboundary water policies between riparian states within transboundary river basins and seeking basin management of resources (Sebastian, 2008:155).

The main thrust of the protocol is to ensure equitable sharing of water and efficient conservation of the scarce resource. According to article 2(b) of the revised protocol, the protocol seeks to:

> advance the sustainable, equitable and reasonable utilisation of the shared watercourses (SADC, 2000:article 2b).

The revised protocol also provides guidelines to manage such shared watercourses in article 4.3. In this regard, and upon the request of a watercourse state, states who share a watercourse should,

> enter into consultations concerning the management of a shared watercourse, which may include the establishment of a joint management mechanism (SADC, 2000: article 4.3a).

Article 5.3(a)(b)(c) of the protocol then called for the establishment of river basin organisations or shared watercourse institutions (SWIs) (SADC, 2000: article 5.3(a)(b)(c); Jacobs, 2009:113).

In addition to calling for the establishment of river basin organisations or SWIs, article 5.4 also calls for an *institutional framework for implementation* on the SADC level. SADC now has a fully functional water sector, comprising a number of organs, such as the Committee of Water Ministers, and the Committee of Water Senior Officials, for example. In addition to the concept of harmonisation explicitly mentioned in article 2(d) of the revised protocol, is the promotion of regional integration. Regional integration is one of SADC's overall objectives and is a process that requires focused cooperation, joint decision-making and suitable institutional arrangements between states. When sharing the use of a single watercourse such as the Orange-Senqu River, integration, at least at a basin-wide level, seems unavoidable. The protocol provides the necessary framework; to be fleshed out in a specific arrangement between the states involved (SADC, 2000: article 2; Jacobs, 2009:113).

River basin organisations or SWIs that support joint infrastructure, planning and cooperation have been established across the region in line with the protocol. The water division at the SADC Secretariat provides a platform for member states to address water-related issues and challenges (Southern Times, 2015).

3.4.2. Basin-wide context

In a basin-wide context, it is important to note that national water laws are explicitly linked to international agreements. They have undergone several adjustments and updates over recent years to be compatible with international agreements (Raadgever *et al*, 2008:10).

3.4.2.1. Bilateral regimes

The bilateral agreements currently operating in the OSRB include the LHWP Treaty (see sub-heading 3.4.2.1.1) signed by Lesotho and South Africa, and the agreement that created the Permanent Water Commission (PWC) (see sub-heading 3.4.2.1.2), which was signed between South Africa and Namibia.

3.4.2.1.1. Lesotho Highlands Water Project

The LHWP, which consists of one phase divided into two categories, Phase 1A and 1B, is considered to be the world's largest transboundary water projects (Wirkus and Böge, 2006:26−7). Phase 1A, constructed at a cost of approximately R20 billion, included the construction of a large dam at Katse on the Malibamatso river (the highest dam in Africa at 180 m), a 45 km transfer tunnel to ’Muela hydropower station and ’Muela tail-pond, and a further 37 km delivery tunnel to the Ash River in South Africa (Hitchcock, 2015:527).

Phase 1B included the Mohale Dam (the highest rock-filled dam in Africa at 145 m), and the Mohale Reservoir, located on the Senqunyane River. There is also a 32 km tunnel connecting the Mohale Reservoir to the Katse Reservoir, and a weir at Matsoku near ‘Muela on the Matsoku River, from which there is a 5.6 km transfer tunnel to the Katse Reservoir. The 72 MW hydropower station at ’Muela connects with the southern African power pool and provides Lesotho with its electricity needs (Hitchcock, 2015:527).

The primary funder of the LHWP, as perceived by the governments of Lesotho and South Africa respectively, was the World Bank’s International Bank for Reconstruction and Development (IBRD), which provided a loan of US$45,000,000 to Lesotho (World Bank, 2007). According to Hitchcock (2015:526), this amount represents approximately 3% of the total project cost. In addition to funding from the IBRD, the project also received funding from the Government of Lesotho, the Development Bank of Southern Africa, the European Investment Bank, the African Development Bank, and various commercial banks and institutions.

There are three major reasons for both governments perceiving the IBRD to be a primary funder despite funding from other institutions. These reasons include: firstly, having the World Bank on board would encourage other potential funding agencies to get involved; secondly, Lesotho was on the list of the World Bank's lowest-income countries and therefore would qualify for a loan; and lastly, both governments felt that having the World Bank support, monitor and evaluate the project would ensure that the project followed World Bank guidelines, thus making it more likely to be acceptable to stockholders of companies, non-government organisations, and communities concerned about social, economic, and environmental issues (Hitchcock, 2015:526).

The LHWP was meant to address South Africa's, particularly Gauteng which is the economic hub of the country and region respectively, dire water scarcity challenges (Klaphake, 2005). The LHWP and its institutional framework have been merged with ORASECOM.

The intentions of the project is two-fold. Firstly, it is to deliver the water in Lesotho, particularly the Senqu, to Gauteng through IBTs; and secondly, the project is to generate hydroelectricity. It is clear that the project seeks to mutually benefit the development of Lesotho and South Africa. On the one hand, Lesotho receives power generation from the provision of low-cost water to South Africa. And on the other hand, this provision of water enables South Africa to address its water demands (Klaphake, 2005).

Engaging third parties or international donors (such as the World Bank) contributed significantly to the LHWP's success. While the role of the World Bank as a provider of credit is quite limited, the bank has financed no more than 3% of overall project costs, its engagement did encourage other donors such as the European Investment Bank to take part in financing the project. The first phase was concluded in 2004 and this has seen the transfer of water at a rate of 29 m^3/s, which is roughly comparable to one quarter of the Senqu's total flow (Wirkus and Böge, 2006:26−8).

The bilateral government treaty signed in October 1986 provides the legal framework of the project. This treaty is considered to be one of the most successfully detailed water regimes to be established in the region because of its ability to provide for

binding rules that also regulate and administer the relations between and behaviour of the two countries (LHWP Treaty 1986; Turton 2004, 274). Since then, six protocols have been added to the treaty (Wirkus and Böge, 2006:23).

Lesotho and South Africa respectively, established independent implementing organisations. On the one hand, Lesotho established the LHDA which is meant to oversee dam construction and operation (LHWP Treaty 1986, articles 7 and 8). Although viewed as essential to the project's poverty reduction goal, the LHDA remains a weak and unsatisfactory institution (World Bank, 2007:9). For instance, the World Bank 2007 report criticised the LHDA for its poorly edited reports. And on the other hand, South Africa established the Trans-Caledon Tunnel Authority (TCTA) which is meant to oversee the financing, credit management, construction and operation of the tunnel system (LHWP Treaty 1986, articles 7 and 8). The JPTC was created as a coordinating and oversight body, with three representatives from each party forming part of the Commission (LHWP Treaty 1986, article 9).

Since this structure failed to yield desired results, a comprehensive reorganisation took place in 1999. The JPTC was reorganised to form the LHWC, which proved to have significant capabilities (permanent secretariat, biweekly LHWC meetings). The LHDA and TCTA were made subsidiary to the LHWC therefore limiting them to a few of highly specific powers. This therefore helped to reorganise the organisational structure (Protocol VI 1999).

> The LHWC monitors and advises on projects relating to finance, administration and technical activities (Turton *et al*, 2004, 241).

One aspect of the LHWP's institutional structure, viewed to be a special feature, is its dispute-settlement mechanism (see Annexure A and LHWP Treaty 1986, article 16). There is the Arbitral Tribunal, a dispute-settlement body that is key to settling disputes in cases where a dispute emerges between the parties that cannot be settled through negotiations (LHWP Treaty 1986, articles 16, (15) (b)). The tribunal is made up of three members, none of whom may be from a party to the treaty. Each side appoints one member. The members, in turn, appoint a third person as their chairman. The members of the tribunal are appointed on an ad hoc basis. In cases where an agreement cannot be reached, a tribunal chairman is appointed at the request of the

president of the International Commission on Large Dams. To avoid biasness in these procedures, the tribunal chairman may not be a citizen of either Lesotho or South Africa. Binding decisions issued by this body are made on a majority basis (Wirkus and Böge, 2006:27−8).

Furthermore, on a political perspective, the World Bank has had an impact on projects in the basin. (Conley and van Niekerk, 2000:144 f.).

Given Lesotho's weak economic status in comparison to its neighbour, South Africa, the World Bank's engagement also served to strengthen Lesotho's position in its dealings with South Africa (Turton, 2003:147). Originally, no institutionalised stakeholder participation was provided for in the LHWP framework. Nonetheless, the World Bank's contribution to the LHWP also faced criticism from various national and international environmental and human rights NGOs (the Highlands Church and Solidarity Action Group from Lesotho and the International Rivers Network among other NGOs) (Wirkus and Böge, 2006:28).

These criticisms included the environmental, social and political impact of the project, and its lack of social and environmental compatibility. This was specifically with regards to the affected land and population (Wirkus and Böge, 2006:28). These NGOs were influential in pressuring the World Bank and representatives of the governments involved, through an agreement reached in 1999 via a memorandum of understanding between the LHDA and interest groups in Lesotho, to enhance cooperation in the following areas:

> monitoring and evaluation activities; advocacy activities; community empowerment activities; service provision; and delivery activities (Meissner 2000, 26).

3.4.2.1.2. Permanent Water Commission

In September 1992, the PWC, a bilateral institution between South Africa and Namibia was created. The commission's task is to provide the governments of the two parties with advice on developing the Lower Orange (the section along which the Orange River forms the border between the two countries). The PWC replaced a Joint

Technical Committee set up in 1987 as a bilateral agreement between Namibia and South Africa while Namibia was still an autonomous region of South Africa. In 1992, following Namibia's independence in 1990, a bilateral agreement between Namibia and South Africa was established which led to today's PWC (Tompkins, 2007:8).

The PWC acts in the capacity of a,

> technical adviser to the Parties on matters relating to the development and utilisation of water resources of common interest to the Parties (see Annexure C) (PWC Agreement 1992, Article 1 and Article 3).

It does this mainly through the preparation of reports. The structure of the commission consists of three delegates from each party. However, the commission has the liberty to appoint additional advisers. Decisions are taken based on consensus. Each party must be financially responsibly and accountably to its own delegation, and also bearing the costs of meetings held there. Nonetheless, the parties share all other costs made in the process. A special feature of the PWC's operation is the inclusion of ORASECOM. For instance, ORASECOM is frequently informed of all PWC activities (Conley and van Niekerk, 2000:141).

The mediation of disputes is made in consultations with the parties involved. In 1992, the PWC established the JIA. It is created for the purpose of large-scale irrigation system on both sides of the Lower Orange (Noordoewer in Namibia; Vioolsdrift in South Africa: the 800 ha VNJIS) (Heyns, 2004:8). According to Van Rensburg (2014:27), back in 1933 when the then South West Africa was under South African control, the government constructed an irrigation scheme on both sides of the river to stimulate agricultural development and job creation. Namibian independence in 1990 meant that the scheme could no longer remain under South African jurisdiction. In 1993 the JIA was established, with a board made up of representatives of the two farming communities, the South African Department of Water Affairs (now the Department of Water and Sanitation) and the Namibian Department of Agriculture.

The PWC also has a Arbitral Tribunal, which serves as a dispute-settlement mechanism. Moreover, there is a separate institution that focuses on matters relating to the Orange River mouth because the Orange River mouth is a wetland under a sustainability threat and is listed in the Montreux Record of Wetlands Under Threat.

As numerous industries are central to this threat, government representatives of both parties as well as representatives of the private sector (mining) have seats on this Orange River Mouth Interim Management Committee (Heyns, 2004:8).

However, the PWC has a weak organisational structure (Conley and van Niekerk, 2000:141). Although ORASECOM is regularly informed of all PWC activities, making it obvious that it is aware of this weak organisational structure, it has failed to address the issue. It is evident that this is one of many crucial reasons for the border dispute between the two parties not being resolved to-date.

3.4.2.2. Multilateral regimes

The multilateral agreement governing the OSRB, which is one of the first river basin institutions in the region, and the first to be established with reference to the Revised Protocol on Shared Watercourse Systems, was the Orange-Senqu River Basin Commission (ORASECOM), and is discussed below.

3.4.2.2.1. Orange-Senqu River Commission

An agreement was signed in 2000 by the OSRB states Botswana, Lesotho, Namibia and South Africa to establish ORASECOM, which serves to enable the development of the Orange River for the benefit of all in the respective basin states. The organisation's establishing document recognises and refers to the Helsinki Rules, the 1997 UN Convention, and the SADC revised water protocol. ORASECOM is the first formal body established to manage shared water resources since the Protocol on Shared Watercourse Systems became an instrument of international water law in SADC (Southern Times, 2015). ORASECOM was established under the *2000 SADC Revised Protocol for Shared Watercourses* (Sebastian, 2008:147).

ORASECOM was to create a framework for multilateral riparian cooperation to investigate and make decisions about future actions dealing with socioeconomic and political issues concerning water management, sustainability and use of the OSRB (Sebastian, 2008:147). Despite this, the central problem of unequal access to water remains essentially unsolved.

ORASECOM serves as a cooperation platform for member states to address water-related issues and challenges. According to ORASECOM executive secretary, Lenka Thamae,

> One of the key values of the four ORASECOM countries – Botswana, Lesotho, Namibia and South Africa – working collectively on a river basin is that it aligns planning and forecasting/projection on future demands and resource availability. In this way, the Commission promotes co-operation beyond theory (Southern, Times, 2015).

ORASECOM recognises the integrated and equitable use of the basin by all riparian states. The commission aims to develop a comprehensive perspective of the OSRB by studying present and planned future uses of the river system and by determining the requirements for flow monitoring and flood management. It is expected to strengthen regional solidarity, contribute to peace and harmony and enhance socioeconomic cooperation.

It is important to note that the existence of a multilateral regime does not replace existing bilateral regimes, nor does it preclude additional future bilateral projects between any of the watercourse states. Rather, it provides a broader forum for overall consultation and coordination between the watercourse states for sound integrated water resources management and development in the basin. However, future bilateral agreements must coincide with ORASECOM.

ORASECOM is authorised to make recommendations based on coordinated water assessments relating to distribution and management, and feasibility studies. Despite this, many hydro-infrastructures (making specific reference to the LHWP), were criticised for lack of proper feasibility studies.

In cases of dispute, SADC Tribunal is appointed as a dispute-settlement mechanism. And the commission recognises this Tribunal as outlined in article 8 of the commission. Decisions made by the SADC Tribunal are considered *final and binding*. The political level of the commission is authorised to make decisions in instances where cases involve differences of opinion between member states.

A major aspect central to ORASECOM's operational difficulty includes dependence on foreign aid. Finance from donors almost always comes with strings attached. Regimes are sometimes unable to align their priorities to those of their funding partners. Partners, in most instances, prefer certain areas of cooperation that differ from those of the parties directly involved. According to Raadgever *et al* (2008:10), the development of transboundary institutions has been driven by donors who have been involved in financing the establishment of the ORASECOM, financing participatory processes, and financing concrete research projects in the basin. Donor funding may not be the ideal financial source for adaptive management, despite its contributions to the development of cooperation and more complete laws (Raadgever, 2008:10). Although water ministers of respective states are responsible for financing ORASECOM, however, external actors also fund the commission. These includes the European Union (EU), France, and the Germany (through the German Technical Corporation) (Heyns, 2004:9).

However, on a more positive note, ORASECOM is starting to gradually receive funding from continental organisations that are starting to become financially accountable and responsive to their issues. The New Partnership for Africa's Development (NEPAD), an economic development programme of the African Union, has provided ORSECOM with R48.6 million in funding towards water security initiatives. In January 2017, the African Water Facility and the NEPAD Infrastructure Project Preparation Facility (NEPAD-IPPF) signed an agreement with ORASECOM to launch the Climate Resilient Water Resources Investment Strategy and Multipurpose Project Preparation. The project received €3.5 million (approximately R48.6 million) of which the African Water Facility and NEPAD-IPPF contributed €2 million and US$1.2 million respectively (Naidoo, 2017).

This co-financed project is intended to promote sustainable socioeconomic growth in the basin's riparian countries through climate resilient water resources development. ORASECOM similarly believes that this project will foster enhanced sustainable water resources management of the basin and increased investments based on better planning, which will in turn allow for more multipurpose projects. It is important that climate resilience will also be integrated in the planning and development of water infrastructure in the basin. This will ultimately allow ORASECOM to effectively and

efficiently address the livelihood needs of the communities living in rural and urban areas (Naidoo, 2017). This therefore symbolises a shift in continental organisations from a dependence on foreign aid approach to a more accountable approach, meaning that enhanced water resource sustainability, management and use is slowing becoming a reality on the African continent, but particularly in the OSRB.

Given the scale of institutional development in the region, however, Lesotho faces difficulties of proper policy planning that will ultimately affect basin-wide institutional planning as far as policy harmonisation and basin management is concerned. In Lesotho, there is no coordinated approach to dealing with land water resources. For instance, Minister Mathaba reiterated,

> Government ministries were dealing with water, land and other related natural resources issues in their individual capacities. As a result, such independent campaigns were not producing the desired results (Lesotho Times, 2017).

It is essential to note that land and water issues cannot be individually addressed. According to Baecher *et al* (2000:73), land issues and land degradation is inextricably linked to the quality, volumes and timing of water flow in the basin.

Mr Mathaba viewed sectors such as finance, planning, agriculture, energy, tourism, industry, education and health as crucial for integrated land and water resources management. But he noted that such integration remains a challenge since,

> various institutions responsible for management of water, land and related resources are applying their own individualised evaluation strategies with their unique objectives and methods. Therefore the impact of these measures is equally limited.

This will further exacerbate the complexity of implementing integrated catchment management (Lesotho Times, 2017).

Moreover, these sentiments are shared by NEPAD-IPPF manager Shem Simuyemba, who asserts that the lack of inclusive water resource sustainability, management and use will further exacerbate the already existing multiple problems related to deteriorating environmental conditions. This will ultimately make it difficult, if not

impossible, to support economic growth and alleviate poverty (Naidoo, 2017). It is therefore evident that Lesotho would need to ensure that different institutions combine their efforts in a coordinated manner to improve its land and water resources management and to achieve the sustainable development goals.

On a positive note, Lesotho's water affairs ministry has adopted various legal tools like the Water and Sanitation Policy of 2007, Water Act of 2008 and Long-Term Water and Sanitation Strategy in 2016 as part of its efforts to address the situation (Lesotho Times, 2017).

3.5 Findings and concluding remarks

This study found that the OSRB faces serious environmental challenges such as depletion and degradation of the basin and land degradation caused by population growth industries, domestic use and climate change. In addition, there is also a serious challenge of unequal access to and/or distribution of the OSRB. Theoretically, it is viable to argue that these environmental challenges and scarcities are placing pressure on the four member states to meet domestic demands. The theory defined environmental scarcity in terms of the three main sources of environmental stress that together form environmental scarcity, i.e. population growth, environmental change and unequal distribution of resources (Homer-Dixon 1994:8−11).

These three forms of scarcity are central to the emergence of environmental conflicts. The increasing emergence of these environmental challenges and the threat of nascent environmental conflicts in the basin further questions the capacity of regional and basin-wide regimes governing the basin. Moreover, Homer-Dixon's environmental scarcity theory emphasised environmental scarcity (water and land, which are the most important environmental resources as environmental causes of violent conflict) (Homer-Dixon 1994:18), caused by population growth, resource maldistribution and resource depletion or degradation, including the interaction among these three sources of scarcity (Solomon, 2014:74).

Homer-Dixon's environmental scarcity theory centres around three arguments regarding these forms of scarcity and their relationship to violent conflicts (demand,

supply and structural-induced scarcity). Firstly, according to the theory, population growth and large population movements caused by environmental stress would intensify pressure on shared resources, thus limiting the ability of states to meet local demands. This will eventually provoke conflict (Cabot, 2017:47). Secondly, the theory argues that the decreasing quality and quantity of land and water resources would make conflicts between riparian countries probable. Lastly, the theory argues that the unequal distribution of resource scarcity would increase economic deprivation and disrupt key social institutions, also making conflict probable (Solomon, 2014:74).

This study further found that little emphasis is given to the threats emanating from climate change and ozone depletion, which are central to affecting the natural cycle of resource production, as far as policy-making is concerned.

With the use of Homer-Dixon's environmental scarcity theory, a nascent conflict can occur in three forms. First, conflict may arise as a result of competing interests between different water users and (unfair) water allocation. Second, tensions may arise between upstream and downstream populations regarding water pollution by human activities (industry and agricultural contamination of water resources, ecological pollution due to untreated wastewater and dumping). Third, possible tensions and conflict may arise due to climate change (droughts and floods), which may affect food security and trigger conflicts in future.

It has been made evident that a link exists between the functioning and/or effectiveness of regimes and environmental stresses in generating conflict. Van Schaik and Dinnissen (2014:33) made a substantial argument outlining the link between the effectiveness of regimes and environmental stress. They argued that environmental stress coupled with weak regimes lay a strong foundation for the emergence of inter-state conflicts.

Through regime theory, this study also found that challenges relating to policy formulation and/or implementation are central to the emergence of environmental challenges and the failure to address them. Although there is progress as far as policy developments in the OSRB is concerned, poor policy implementation remains. For instance, water management in the basin has traditionally concentrated on large-scale

infrastructure, such as dams and water transfer pipelines, tailored toward meeting the short-term water demands of individual countries. However, there are long-term adverse effects of large-scale infrastructure (Raadgever, 2008:11).

One of the problems central to policy formulation and/or implementation is a dependence of foreign aid and the failure of member states to take financially accountability for their own institutions. Although it can be argued that financial contributions of international donors have been quite instrumental in developing large infrastructural works, which increased the availability of resources, this also increases dependence on third parties. The OSRB financing system is still dependent on foreign donors, thus compromising institutional capacity and effectiveness (Raadgever, 2008:11).

For instance, both on a regional and basin-wide perspective, SADC and the PWC have failed to mediate the border dispute between South Africa and Namibia, which has been going on for years and remains a problematic issue. The problematic aspect of this border dispute is that it is one of the oldest boundary disputes in the world, thus further questioning the effectiveness of relevant institutions governing the basin (Oduntan, 2015). Oduntan (2015) further notes that border disputes have been a reality on the continent through the millennia. Today, close to 100 active border disputes exist across the continent. Rising nationalism, population and environmental pressures mean that the situation is likely to get worse.

In general, regarding a link between a nascent environmental conflict and regime capacity in the OSRB, this chapter can draw two important findings. Firstly, the increased environmental scarcity evident in the OSRB will lead to further resource capture and extensive ecological marginalisation. This will subsequently challenge the authority and effectiveness of governing water institutions and possibly weaken and/or collapse them. As a result, OSRB riparian states and societies will be exposed to the effects of environmental scarcity and, due to this vulnerability, will fail to adapt. In the same process of vulnerability is the possible emergence of localised and regional environmental conflicts where stronger groups and/or states (South Africa in this case) will attempt to confiscate large proportions of the shared resource and further restrict

access to the basin by other parties (Namibia and Lesotho in this case) through treaties.

As witnessed in the case of South Africa in its relations with Namibia and Lesotho respectively, their behaviour isn't converging as a result of agreements and property rights that perpetuate unequal access to, and distribution of, the OSRB. Despite the existence of levels of sharing information, bilateral and multilateral agreements and harmonised national laws to pursue common standards in the basin, such structurally-induced scarcity will further exacerbate the already existing mistrust and fear of exploitation among OSRB riparian countries.

However, the OSRB riparian countries can use the already functional and existing regimes to their advantage and adapt to the effects of environmental scarcity, thus avoiding a nascent environmental conflict. This is only possible under certain circumstances. First, a sense of strong political will is required of the OSRB water regimes, which will subsequently ensure institutional capacity. In light of these regimes having failed to address issues such as land degradation caused by industries, mining and other human-induced factors, the implications of the construction of larges dams and IBTs on people and the environment, and unequal distribution of the OSRB, this chapter therefore deduces that a much needed political will in the basin is lacking.

Given that political will is entrenched in governing water regimes, this will enhance institutional capacity to prevent the possible weakening and collapse of institutions. Furthermore, OSRB riparian countries need to commit to sharing information, establishing agreements that provide for equitable access and distribution, harmonising and updating national laws to combat the effects of land degradation (all of which are essential ingredients for establishing common standards). The results of these commitments will lay a foundation for regimes to address environmental scarcity and therefore develop effective dispute resolution processes meant to address potential environmental conflict, either local or regional.

Maintaining a sufficient supply of water in the OSRB will remain a challenge. Despite, the LHWP's perceived win-win scenario for both South Africa (i.e. access to water) and Lesotho (i.e. power generation), however, the ecological, social, and political costs

as a result of the project cannot be ignored (Wirkus and Böge, 2006:26−7). Furthermore, attempts to increase supply by construction of more phases of the LHWP could further produce social and environmental risks. Conflicts may develop between South Africa and Lesotho over the LHWP Treaty.

In order to address the tensions and disputes between Lesotho and South Africa over the LHWP Treaty, a rectification of the treaty is very necessary. In addition, this implies adjustments to the dates of review of the treaty to curb the current climatic pressures. After all, paragraph 1 of article 16 of the treaty titled *Procedure for Review and Revision* states,

> The provisions of this Treaty shall be reviewed at intervals of twelve years, calculated from the date of signature hereof or at such other intervals as the Parties may agree upon.
>
> The third of such intervals would be the year 2022 (New24, 2016).

It is evident that bilateral agreements and multilateral treaties have dominated co-riparian relations in the OSRB (Kistin and Ashton, 2008:396). According to Jacobs (2009:113−4), institutional development on the OSRB has been fragmented but successful where it has occurred, reaching a level of sophistication and success not found in other river basins in southern Africa. Moreover, institutional arrangements have evolved over time and reflect the changing political, social and economic transformations that have occurred in the region (Kistin and Ashton, 2008:391). However, the evolution of these institutions, as witnessed earlier, is still confronted by the challenge of foreign aid dependence. Furthermore, these institutions have also failed to resolve critical issues in the basin, specifically, disputes over borders transcending through transboundary basins.

Despite the South Africa-Namibia border dispute not yet culminating in an outright transboundary conflict, it poses a serious threat to the stability of the region. It also questions the effectiveness of SADC to take accountability and deal with nascent transboundary disputes in the region, particularly in the OSRB. This is also reflective of the dispute between Namibia and Botswana over the Okavango river basin, which was resolved by the International Court of Justice (ICJ) instead of the regional body.

This study also found that Namibian exploitation of the Okavango River was a clear source of disagreement with Botswana.

With about 13 contentious cases concerning territorial or boundary disputes between states being submitted to the ICJ and the Permanent Court of Arbitration, it is evident that African states have been making use of, and relying heavily on, these international judicial institutions (Oduntan, 2015).

The inability of SADC to take responsibility for territorial disputes emerging within its jurisdictions mean that cases will be confronted by Eurocentric international law (seeing that the compositions of both judicial institutions is unrepresentative of Africa) rather than regional or continental-based law, thus compromising the interests of African countries. The only instance when African states initiate resolving border disputes is through the use of indigenous mechanisms, therefore questioning the legitimacy of those mechanisms. For instance, in an attempt to resolve the Namibia-South Africa border dispute over the OSRB, the then presidents of Namibia and South Africa, Sam Nujoma and Nelson Mandela respectively, only managed to reach *a gentlemen's agreement*. Maybe this is a sufficient reason for the bone of contention over the border persisting even today.

ORASECOM's weak capacity, led to the agreement that support from foreign donors is still crucial at this point to stabilise and monitor the progress of the commission. Sources suggest that the German DC should continue to support ORASECOM (assistance in setting up a secretariat and in working out an IWRM plan) and undertake to ensure that the positive experiences with ORASECOM are disseminated and used in other river basins (ORASECOM as the core of a centre of competence).

In conclusion, it is important to note that environmental stresses (rapid population growth, resource degradation and depletion, resource distribution and climatic variations as a result of climate change) and regimes (institutions, treaties and agreements) influence each other. Both these aspects determine the emergence and extent of environmental conflicts. As Earle (2005:57) stated earlier, the institutional capacity to adapt and/or address environmental stress is inherent to the emergence of environmental conflicts (Earle, 2005:57). Similarly, Hendrix and Salehyan (2010)

also noted that the interaction of environmental stresses with ideational factors such as institutions and/or regimes is key to whether water-related conflicts develop. As capacity building supports the ability to manage water resources effectively and to maintain local water infrastructure, it ultimately contributes to riparian countries' and people's resilience (Meyer, 2013:57). Despite the conflict potential in the OSRB as a result of existing disagreements, the basin's high level of institutionalised cooperation and the possibilities for IBTs could help alleviate water stress and resolve bilateral disagreement over shared water resources.

CHAPTER 4: THE NILE RIVER BASIN

4.1 Introduction

The Nile is one of Africa's most complex cross-border rivers basins (Ashton, 2002:1), given the volatility and proximity of the basin. As a result, three distinctive but related challenges are visible. According to Kieyah (2007:2),

> The Nile Basin faces considerable challenges. These challenges include rapid population growth, environmental degradation, unequal distribution and insecurity.

These challenges combined have affected the management, sustainability and use of the basin.

Firstly, simply because of the number of riparian states dependent on its resources, the Nile is confronted with a huge problem of a rapid population growth, which ultimately places pressure on the land and water resources of the basin. Secondly, the Nile River's water is limited while the needs of the riparian countries continue to grow, making the potential for conflict very real. And lastly, the NRB is also challenged by disputes over the unequal use of water between upstream and downstream riparian countries (Jacobs, 2006:13; Solomon, 1996:3).

Shinn (2006) argues that the most important of these eleven riparian countries are Egypt and Sudan. The remaining nine riparian countries do not benefit equally from the Nile water. This is the result of two separate agreements: the 1929 Nile Agreements concluded between Great Britain, Northern Ireland and Egypt, and the 1959 Nile Agreement concluded between Egypt and Sudan. In short, both agreements grant Egypt and Sudan the absolute right to use 90% of the river's water, leaving the upstream countries to share 10%, which created an unsustainable situation. Riparian countries' use, or rather the restriction of their use of Nile, has direct implications for their national interests (Adar, 2007:63). For instance, most upstream countries have a limited ability to develop economically and socially, which has resulted in political instability, famine and chronic malnutrition (El-Fadel *et al*, 2003:113). Upstream countries' developments are impaired as they are forced to either abandon certain

projects due to their limited access to water, or to gain approval from Egypt to use the Nile to construct water-related projects (Kameri-Mbote, 2007:3).

A delicate conflict over the equitable allocation of the Nile's water represents one of the most crucial issues on the African continent. In parts of north-east Africa, politics have been shaped and affected by the Nile, creating a new landscape of global conflict (El-Fadel *et al*, 2003:113). Reyskens (2011) asserts that countries become susceptible to conflict if the resource they are dependent on is either threatened or removed. Such scarcities and inequalities regarding a shared resource make disputes increasingly heated (Klare, 2002:139). According to Lowi (1995:124), this has created a situation that could lead to an outbreak of war. It is evident that the NRB states need to establish and/or put into effect a cooperative framework to manage, sustain and use the basin.

Similar to chapter 3, this chapter is divided into four sections. The similarity in the chapter's demarcation and application of theories[17] respectively is due to the NRB, although located in an entirely different region and aligned to a totally different regime with different protocols etc., posing the same serious environmental and regime challenges detrimental to combustible hydropolitics over shared water resources as the OSRB.

4.2 Description of the Nile River Basin

The Nile is the longest river in the world measuring approximately 4,100 miles or 6,700 km (Kameri-Mbote, 2007:1). The Nile River Basin (NRB) is located in North-East Africa. It is an international water resource that is shared among 11 riparian countries (see map 6), which are the Democratic Republic of the Congo (DRC), Sudan and South Sudan, Uganda, Rwanda, Kenya, Tanzania, Burundi, Ethiopia, Egypt and Eritrea. All these riparian countries are highly dependent on the river since it flows across and around each of these countries. Its volatility and proximity makes it prone to conflict over water and as a result makes it a worthwhile study. Given the background of the basin, also mentioned in Chapter 1, the following section unpacks

[17] Homer-Dixon's environmental scarcity theory, and regime theory

the prevalent environmental scarcity challenges in the basin and its impact on basin states.

Map 6: Map of the Nile River Basin (NRB) (Zaki, 2014)

4.3 Homer-Dixon's environmental scarcity theory: an analysis of environmental scarcity in the Nile River Basin

4.3.1. Demand-induced scarcity: population growth affecting water resources in the Nile River Basin

According to Savanije and van der Zaag (2000:14), water scarce countries that have high rates of population growth frequently find themselves involved in intra- and

interstate conflicts over scarce water resources. With the demand for water resources continuously increasing, it generates numerous problems that will confront many international rivers (Marty, 2001:14).

Baecher *et al* (2000:11) state that countries along the Nile are challenged with population growth. The argument is that continued population increases, will definitely contribute to water demands in the basin. Thus if the Nile is continuously used as a water resource for this growing population, it will become a source of conflict. According to the Nile Basin Initiative (2012a) population growth in the NRB increases at an unprecedented rate. The total population of the basin countries was 424 million in 2010, of with 232 million lived in the basin. By 2025 the initiative estimates that the inland parts of the basin countries' population will grow to 600 million people and more than 300 million people will live along the NRB.

Total population estimate in the NRB for 2030 is 647 million, as argued by The United Nations Population Division (UNPD). This is an increase of 7.8% from the population in 2025 and 52% from the population in 2010 and over half of these people will be living within the basin boundaries (Nile Basin Initiative, 2012b:228). Because of migration to the NRB and concentration of population growth in the NRB, population activity has therefore worsened, thus increasing pressure on the natural resource base (UNEP, 2006:1).

A UN report released in 2011, *Information Products for Nile Basin Water Resource Management*, also finds these population projections alarming and calls for new ways to use water. The manner in which water is used determines the outcomes of food security and/or insecurity. More concerning as argued by the report is the fact that some of the Nile countries are among the poorest in the world (United Nations, 2011:116).

Because of rapid population growth in the basin, societies living closest to the Nile have been confronted by pressing environmental, social and economic challenges (UNEP, 2006:1-5). Baecher *et al* (2000:12) indicates that urbanisation will also pose special challenges as most NRB countries are expected to increase their urban populations dramatically. Challenges posed by urbanisation are related to the demand

for water supply such as water delivery, drinking water, sanitation and wastewater treatment.

Demand-induced scarcity as a result of population growth is worsening. This situation is worsened as a result of the per capita water availability in the NRB countries, which is expected to fall drastically (Okbazaghi, 2008:5). This predicted fall in per capita in water availability and the water supply disputes associated with the fall will eventually lead to conflict among these riparian countries. For example, by 2025 it is anticipated that Rwanda, Burundi, Ethiopia, Kenya and Egypt will experience water scarcity, while Tanzania, Eritrea and Uganda will be under severe water stress (Karyabwite, 2000:6−7).

Xercavins (1999:158) asserts that water scarcity is a condition in which the annual availability of internal, renewable fresh water is 1,000 cubic metres or less per person. Water stress is a condition in which the annual availability of internal, renewable fresh water is less than 1,667 and greater than 1,000 cubic metres per person in the population.

Water scarcity is a situation where there isn't sufficient water to meet the demands of all sectors of society. Water scarcity can take place at any stage of supply or demand. Scarcity can be a social construct. This relates to societal behaviours that have ultimately altered supply patterns (UNDESA, 2013).

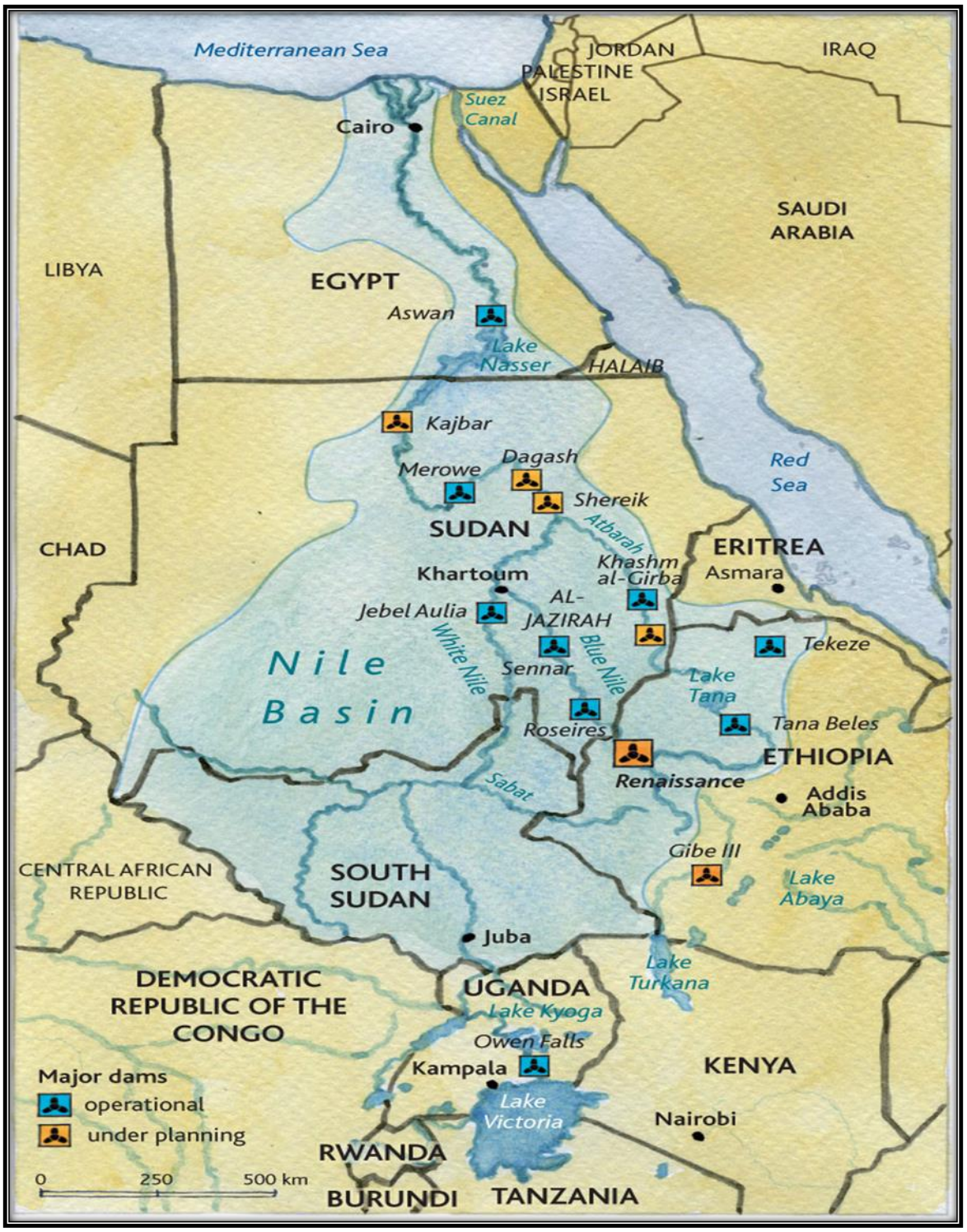
According to the UNEP (2012:18), the concept of water stress applies to situations where there is not enough water for all uses, whether agricultural, industrial or domestic use. Based on these criteria, the UN estimates that by 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity and two-thirds of the world's population could be under conditions of water stress. Due to these population projections, Stoa (2014:1353) asserts that it is not surprising that the NRB is therefore viewed as one of the most degraded in the world. Other causes of this degradation include natural disasters, political instability and poor watershed management, which makes the situation worse when they interact with rapid population growth.

Rapid population growth in conjunction with a fall in per capita water availability, will leave most of the riparian countries with interstate and internal conflicts, famine and endless droughts (Okbazaghi, 2008:5). According to Stoa (2014:1353), 70% of the NRB‘s population relies on rain-fed agriculture for their livelihoods. As a result, there has been a reduction in soil fertility and dry season flows, while droughts and floods put vulnerable populations at further risk of food insecurity.

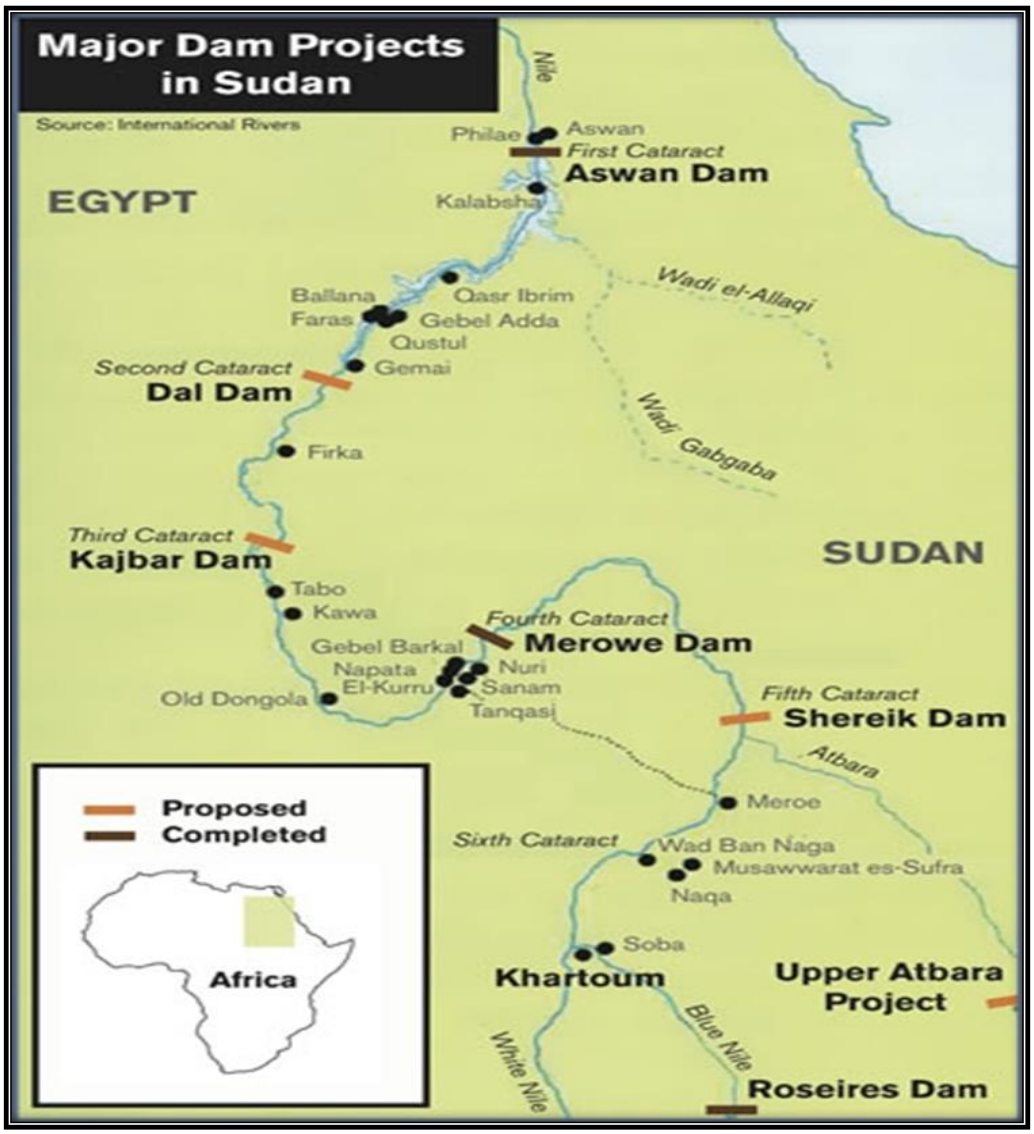
In 1965 and 2006 respectively, Ethiopia faced enormous drought conditions and famine. This is despite of it being the tributary of the Blue Nile. This has subsequently led to Ethiopia being highly dependent on international food aid (Okbazaghi, 2008:5). Despite agricultural activities’ intentions to support a growing population, however, nonpoint pollution, siltation and erosion produced by these activities are also key to the fall in per capita water availability (Baecher *et a*l, 2000:11). The extent of water scarcity in the region has pushed the Nile’s water from being a low policy priority to a top national policy priority (Okbazaghi, 2008:5). Immense pressure is being placed on the Nile and its resources, because of the estimated population growth in the basin countries. This will lead to serious degradation and negatively affecting and/or reducing outputs (Okascha, 2012:15).

What has also worsened the issue of demand-induced scarcity in the NRB is the involvement of China in the hydropolitical landscape of the Nile, which symbolises a monumental change to NRB hydropolitics. This is witnessed through China’s financial role in support of hydraulic infrastructure in upstream countries (see maps 7 and 8) (Cascão, 2009:249−51).

Map 7: Chinese support to hydraulic projects in the Nile (Ayeb, 2013).



Map 8: Chinese support to hydraulic projects in Sudan (International Rivers, 2015)



It is sufficient to argue that countries currently developing water resources through dam projects are doing so in response to pressures from population growth and economic development (Veilleux, 2013:1). However, the social and environmental implications for the inhabitants associated with these projects are far greater than the hydropower potential expected.

These implications can be proven, through Homer-Dixon's environmental scarcity theory, to be detrimental to the welfare of the Nile, with a subsequent emergence of conflict. Environmental scarcity has been exacerbated and population growth has not

been addressed, resulting in thousands of displaced people in the basin who are populating small unsustainable areas.

The development of hydropower projects, given that they are developed unilaterally, does not entail equitable use; rather it follows an every man for himself scenario, which will not help the peace and cooperation process in the basin. Considering that tensions have always been high between upstream and downstream countries, this further exacerbates existing delicate relations.

Furthermore, the rising demand to unilaterally develop large hydropower projects in upstream countries has rapidly increased the consumption of the Nile and has negatively affected the supply of limited water resources available to each riparian country. In response to alarming power shortages, upstream countries have opted to develop large hydropower projects. However, these hydropower stations have not reversed the situation.

For instance, with a growing economy and an increase in population in Uganda, the two hydropower stations (the Karuma hydropower project and the Ayago north and south hydropower dams) have not reversed the power shortage and/or crisis, and poverty in the country. These hydropower stations only meet a fraction of Uganda's electricity demand. According to Ugandan State Minister of Energy Simon D'Ujanda, only 9% of Ugandans have electricity (Afedraru, 2014).

These projects have also been responsible for displacing communities living along the Nile. According to Pottinger (1996) these large projects have not reversed poverty and power shortages, but have made it worse through major displacements and the destruction of arable land (Pottinger, 1996). This is due to China not imposing environmental, human rights or good governance conditions prior to funding (Thakur, 2009:10). Pottinger further states that the benefits of these projects are concentrated in the hands of a very small elite (1996).

The lack of proper coordination between the Nile riparian countries has led to the construction of these hydropower projects being subject to inadequate environmental

and social assessments, leaving devastating environmental and social impacts as discussed through demand-induced scarcity.

The issue of the lack of proper social and environmental assessment studies and the impact that large projects have on inhabitants can be traced back to 1899, during the construction of the Aswan Low Dam[18] when thousands of Nubians were forced to move to agriculturally unsuited areas in the West Bank of the Nile around the Aswan region. This was followed by a second and traumatic displacement of 120,000 Nubians in both Egypt and Sudan in May 1964, when the second stage of the construction of the Aswan High Dam commenced. Similarly, these displaced people were taken to villages far from the Nile and away from their agricultural subsistence (Scudder, 2003:1).

Today, China's lack of proper environmental studies has similarly affected the population of the basin. For instance, a proper environmental impact assessment of the Merowe Dam and the Kajbar Dam projects[19] was not carried out. As a result, many people were displaced and a number of human rights violations occurred. On the one hand, the Merowe reservoir, with a length of 174 kilometres displaced more than 50,000 people from the fertile Nile valley to an arid desert location (Brewer, 2008:11). Similarly, the Kajbar Dam displaced 10,000 people. On the other hand, thousands of protesters were killed and some injured in protests from the affected communities (Bosshard, 2015).

While many African leaders perceive Chinese funding as an opportunity, China's lesser concerns for the environmental and social impact poses a number of threats to the populations and resources along the Nile. Bosshard (2009:48), for instance, argues that Gibe III and IV[20] have created possible devastating effects on the environment and people living along the Omo River[21] (Bosshard, 2009:48).

Since the Gibe III and IV dams are located on the same river (the Omo River), they will also negatively affect natural habitats if inappropriate environmental and social

[18] Egypt
[19] Both in Sudan, north of the capital Khartoum
[20] Both in Ethiopia
[21] Ethiopia

studies are conducted. The preservation of the only two means of survival in this arid environment, i.e. recessional cultivation of food along the riverbanks, and livestock herding, is threatened by the seasonality of flows in the Omo River and the decrease of water levels of the Gibe III dam. (BBC, 2010).

Terri Hathaway, the Director of International Rivers African Programme claims that:

> Gibe III is the most destructive dam under construction in Africa. The project would condemn half a million of the region's most vulnerable people to hunger and conflict, (BBC, 2010).

Bosshard (2009:48) further argues that Gibe IV will push the fragile ecosystem of the lower Omo River Valley and Lake Turkana to the brink of collapse.

As such, the unilateral developments of upstream hydropower projects through China's financial support have exerted pressure on the Nile by increasing the consumption of water, thus decreasing the amount available to each riparian state and aggravating the demand-induced scarcity. This kind of scarcity could lead to conflict, as argued by Homer-Dixon's environmental scarcity theory.

The environmental scarcity theory posits that,

> an increase in consumption levels decreases the amount of limited natural resources available to each individual and/or state, (Bingham, 2001).

Homer-Dixon (1999:48) asserts that demand-induced scarcity has the potential to cause interstate conflict in that the *uncoordinated* use of a resource such as shared water resources by one economic actor reduces its availability for others. This could lead to increased intergroup competition, which can take the form of violent conflict.

It is, however, important to note that these hydropower implications are not only limited to demand-induced scarcity, but also affect and exacerbate supply and structural-induced scarcities. It is important to remember that these forms of scarcity don't act in isolation from one another, but often occur concurrently and interact with one another (Homer-Dixon, 1994:8-11).

4.3.2. Supply-induced scarcity: degradation and depletion of water resources in the Nile River Basin

Parts northeast of Africa represent one of the most water scarce areas in the world. The NRB remains the region's only reliable source for renewable water supplies. However, the Nile's water does not flow in sufficient quantities to satisfy the future water demands of all these riparian countries (Ohlsson, 1999:211).

The NRB is facing challenges of water scarcity as NRB countries are known for their arid and semi-arid conditions. According to Ashton (2002:5), the southern and the northern portions get less rainfall than their equatorial neighbouring countries. For instance, 98% of Egyptian territory is desert, with Ethiopia, Sudan and Kenya receiving between 200 and 800 mm/year of variable rainfall (Chesire, 2010:15). Karyabwite (2000:6−7) argues that rainfall in the Nile region varies from zero in the Horn of Africa to more than 400 mm/year in Sudan's western equatorial region. This discrepancy in rainfall negatively influences the annual flow of the Nile. The estimated decrease of water available to the Nile countries is largely due to the population increase in the basin.

Water scarcity along the Nile has intensified the potential for conflict between upstream and downstream riparian countries. This scarcity is a result of factors such as degradation, distribution and population growth, among others. The effects of Nile scarcity are substantial factors that lead to internal strife and conflict between nations (Wiebe, 2001:736). As the scarcity of water increases in the NRB, so does the dependency of the riparian countries on the Nile for their development (Kassa, 2010:472).

The water security situation in the northeast region of Africa is worsening. The region faces challenges from climate change and the resulting continual threat of drought. For instance, between July 2011 and mid-2012, the region faced what is said to be the worst drought in 60 years. The drought caused a severe food crisis that threatened the livelihoods of approximately 9.5 million people (The Journal, 2012).

According to Few *et al* (2015:23), mean temperatures across the region have increased by 1 to 3°C over the past 50 years. They further argue that evidence exists of increasing changes in extreme temperature events such as extreme maximum temperature, warm days, warm nights and the duration of warm spells as a result of climate change. These regional trends are supported by climate research at the national level (Few *et al,* 2015:23). Furthermore, the already precarious water situation is also threatened by pollution from sprawling riverbank communities. This is the biggest problem with transboundary basins, where pollution from one area flows into another area (Di Nunzio, 2013:2).

The region's already scarce water supply is depleting because of population growth in all 11 riparian countries in the NRB, and most importantly because the demands in agriculture, industry and domestic use are rising (Di Nunzio, 2013:2). For example, agricultural productivity is affected by population increase. Agricultural activity is also affected by resource degradation, and that, in turn, is affected by the land-use decisions people make based on population size (Baecher *et al*, 2000:11). Farming techniques like overgrazing by domestic livestock, agricultural practices in irrigated and large-scale farms in rain-fed areas, poor cultivation practices which all constitute inappropriate land-use have the greatest impact on land degradation. In the NRB, these are the most common land use practices.

On the occasion of the sixth anniversary of Africa Environment Day, the then Chairperson of the AU commission H.E Professor Alpha Oumar Konare asserted,

> …for us to circumvent the threats posed by environmental degradation, it is imperative that the States and Governments of Africa formulate and implement appropriate policy and legislative frameworks that would ensure the sustainable management of the environment. It is therefore essential that environmental issues are mainstreamed into the national policies planning processes in a way that would ensure maximum involvement of the local populations (African Union, 2008:4).

The concentrated communities located along the NRB heavily depend on farming. However, famine, ensuing drought, land degradation and population growth have seriously affected the water resources in the NRB. This is the result of excessive

burning for land cultivation along various parts of the Nile River. This has eroded the land and ultimately makes water conservation and cultivation very difficult (Rahman, 2011). Kofi Anan argued,

> unsustainable practices are woven deeply in to the fabric of modern life. Land degradation threatens food security. Forest destruction threatens biodiversity. Water pollution threatens public health and fierce competition for fresh water may well become a source of conflict and wars in the future (UN Press Release, 2001).

Land degradation, agriculture, industry and domestic use are factors that plays a crucial role in the depletion and degradation of the Nile. Land degradation is inextricably linked to the quality, volumes and timing of water flow in the basin (Baecher *et al*, 2000:73). Land degradation also has become an enormous challenge between and within the Nile countries (Di Nunzio, 2013:6). Take the Rwandan genocide as an example. The enormous displacements that ensued, left 60% of its forest damaged and 70% of its land severely degraded (Bigagaza *et al*, 2002:51−2; Binningsbø *et al*, 2007; Conniff, 2017). Furthermore, Burundi has also lost 30% of its land to degradation (Kigomo, 2003).

Kenya faced severe land degradation. In 2002, 30 % of its land was degraded, and by 2008 a third of Kenya's population resided in degraded land. This is similar to Sudan, where 76% of its population resides in degraded areas. The Highlands in Uganda, Tanzania and Ethiopia are all confronted with degradation. The north-western delta in Egypt faced the highest degradation because of increased salinity and contamination. The reason for this is that Egypt lies downstream and receives water flow after it has been polluted upstream. Practices like poor cultivation, especially seen in parts of the Ethiopian highlands and the Egyptian delta, are severe and have contributed immensely to soil erosion (Desta, 2012:10−13).

Secondly, agricultural practices have the potential to contribute to nonpoint pollution from the use of chemical fertilisers and pesticides (Somboek and Sene, 1993; Baecher *et al*, 2000:73). Agriculture is the largest consumer of water in Egypt using about 85% of available water. Drainage water from agricultural fields contains pollutants such as pesticide residues, toxic organic and inorganic pollutants, salts and treated and

untreated domestic wastewater (Water Policy Program, 2002:6). Irrigation in the Nile accounted for about 80% of renewable water resources (United Nations, 2011:61).

There are over 90 agricultural drains discharging into the Nile that also include industrial wastewater. This drainage has led to a high salinisation (a build-up of salts in the soil) and saline intrusion (when the ground is saturated with saltwater) in the delta. This build-up of salts in the soil means the soil cannot retain water, which prevents anything from growing (NBI, 2005:24). Such effects on the soil, which then cause a decline in precipitation, tend to favour soil erosion (Libiszewski, 1992:3).

Given that domestic agricultural demand to sustain a growing population has exacerbated the scarcity of water, this growing demand is not only limited to the basin countries. For instance, India and Saudi Arabia have turned to large-scale land and agricultural investments in upstream countries (Ethiopia, South Sudan and other East African countries) to help feed their own growing populations (Lamere, 2012). A 2011 UN report on the use and management of the Nile, which also includes the results of a decade-long project led by the Food and Agriculture Organisation of the United Nations (FAO), suggests that new methods to boost agricultural productivity are required and that governments must take action to keep population growth and resource degradation from intensifying poverty (United Nations, 2011:103).

Thirdly, mining, although not widespread in the basin, is another source of both erosion and run-off pollution. It has been noted that mines in Kilembe, Uganda, release large quantities of copper and cobalt into streams and rivers on surrounding lakes (Kwetegyeka *et al*, 2014:482). There are also 36 industries that discharge their pollutants directly into the Nile, and into the irrigation canals. These types of industries include chemical, electrical, engineering, fertiliser, food, metal, mining, oil and soap, pulp and paper, refractory, textile and wood (NBI, 2005:33). Fourthly, in villages, where the only available water is from irrigation canals, women use the water for domestic purposes and dump the used water back into these drainages.

Egypt is a major contributor to the environmental degradation of the Nile. However, the Nile water degradation in Cairo is subject to both internal and external factors. Internally, Cairo's contribution to degradation is a result of rapid urbanisation,

inefficient irrigation, pollution and regional upheavals (Dakkak, 2013; Ayad, 2013). According to Dakkak (2013), the rapid population growth in Egypt, which is projected to grow from its current total of 80 million to 98.7 million by 2025, poses a threat to Egypt's water supply. This increase in population growth will require more water for domestic consumption and irrigation purposes.

Another leading factor in Egypt's water degradation is inefficient irrigation (excessive water use). This is due to half of Egypt being desert; only 6% of the country is arable agricultural land. Egypt receives less than 80 mm of rainfall a year, forcing the country to depend on inefficient methods of irrigation such as excessive watering and the use of wasteful irrigation (e.g. where gallons of water are pumped over the crops).

Lastly, pollution in Egypt poses an extreme threat to water supply. For instance, agricultural run-offs, industrial effluents and municipal sewage are being recklessly dumped into the Nile, leaving its water unfit for human consumption. Agricultural run-offs contain pollutants such as pesticides and herbicides, which have a negative effect on the river and the people using it. Industrial effluents containing heavy metals are highly toxic (Dakkak, 2013).

Externally, upstream of Cairo (to the south of the city), the Nile receives large flows of mostly untreated domestic, agricultural and industrial wastewater. For instance, between the Aswan High Dam and Cairo, 43 towns with a population exceeding 20 million and approximately 2,500 villages discharge their waste into the river. In addition, most of the residents in the region depend on irrigated agriculture for their livelihood, and 29 billion cubic metres (BCM) of drainage water loaded with fertilisers, pesticides, and organic material is returned to the Nile upstream from Cairo annually. More than 50 major factories discharge approximately 250 BCM per year (BCM/yr) of industrial wastewater (Ayad, 2013).

Without a cooperative framework, countries along the Nile such as Burundi and Ethiopia are taking advantage of the Arab spring and the political strife that has engulfed Egypt and are gaining more control over the Nile. With the Nile supplying 95% of Egypt's freshwater, losing some of the water supply can cause additional problems for Egypt (Dakkak, 2013).

Environmental degradation and depletion in Cairo poses an alarming threat of conflict in the region. In the near future, high levels of water degradation assume that Cairo will consume approximately 20% more water than it already does. This supposes that other riparian countries will be left with little, if any, water to consume for developmental purposes. This minimal consumption by other riparian countries at the hands of their downstream neighbour, which has maintained dominance over the use of the Nile for decades, makes the potential for disputes and conflict more likely. The water issue in Egypt is rapidly assuming alarming proportions. With the lack of effective and efficient water conservation techniques, other riparian countries' water supply are being highly affected (Dakkak, 2013).

Another cause of NRB depletion is global greenhouse emissions. This argument is consistent with the effects of climate change in Ethiopia. Climate change in Ethiopia has led to both a more variable climate and more extreme weather events such as the drought that engulfed the entire country between 1970-1980 (Rahman, 2011). Kim and Kalaurachchi (2009:1363) argue that global warming as a result of climate change and greenhouse emissions is one of the leading contributors to the current decline in the NRB water resource. This severe impact of global warming is also significant to the reduction of underground water in the Blue Nile in Egypt and Sudan.

Development along the Nile has led to water resource pollution by many riparian countries and dates back to the Ethiopian and Eritrean wars in the late 1990s. Military accoutrements and missile deposits were thrown into the Nile River, polluting a substantial part of the river basin (Rahman, 2011).

The manner in which the land, water and watershed have been degraded in the NRB has produced and sustained poverty. These resources fail to provide a sustainable or desired flow of water to neighbouring communities and countries, which exerts even greater pressure on the available water resources for agricultural and industrial purposes. Another problem related to degraded watersheds is that they often lead to erosion and therefore export water of poor quality that affects downstream countries (Baecher *et al*, 2000:39).

Environmental implications for the Nile are controversial as far as China's involvement in the basin is concerned. This raises the question of whether China is addressing the overwhelming pressures on water supplies in the NRB or increasing them. These unilateral projects in upstream countries are having a negative impact on the sufficient transfer of water, which is detrimental to ensuring peace and security in the region.

Soil conservation in the basin has been heavily affected because effective environmental and social impact assessments were not carried out. For instance, the displacement of people during the construction of the Merowe project hugely affected agricultural activity. A concern when it comes to the retraction of arable land and displacement is that agricultural activities cannot be restored at the new resettlement sites because the soil is too poor and does not compensate for a realistic source of income despite the provision of irrigation water (Brewer, 2008:11).

In 2006, the Swiss Federal Institute of Aquatic Science and Technology, in an independent review of the Merowe project, outlined that strongly fluctuating water levels and sedimentation would have a serious negative impact on aquatic ecology, water quality and public health. As a result, Europe, Canada and other financial institutions withdrew funding for this project. However, the project went ahead because of Chinese funding (Brewer, 2008:11).

In the entire NRB, 1 million ha of fertile land has been destroyed because of hydropower stations and dams. The loss of arable land was also witnessed in Ethiopia through massive landslides that took place in the Tekeze River[22] as a result of the construction of the Tekeze hydroelectric dam. Many environmentalists, including Richard Leakey, have expressed concerns about the possible impact of the Omo River dams on Lake Turkana[23] (Greste, 2009).

According to an International Rivers environmental group report, the completion of the Gibe III dam will have a negative impact on the water quantities for communities that live near Lake Turkana in neighbouring Kenya. The survey predicts that in these areas, including areas near the lake, there will be more conflict if the water levels decline

[22] Ethiopia
[23] Kenya

(GeeskaAfrika Online, 2015). This prediction is not limited to within riparian countries, but also applies between riparian countries. There is currently no comprehensive integrated water resources management plan for the Blue Nile basin and no adequate monitoring infrastructure or erosion-prevention efforts (Veilleux, 2013:6).

According to Ugandan environmentalist Muramuzi (2011), Lake Victoria,[24] the largest lake in Africa and the most renowned source of the Nile, is slowly and gradually shrinking due to the increasing number of hydropower projects and irrigations in Uganda, which draw large amounts of water out of the Lake.

With millions of people in the basin severely affected by soil degradation, these uncoordinated development projects will further affect water security, soil conservation and food production to supply a growing population. The soil degradation has rendered large amounts of arable land unusable for food production (Muramuzi, 2011).

It is evident that these unilateral projects have produced a supply-induced scarcity in that they have intensified the degradation and depletion of the Nile. According to Homer-Dixon's environmental scarcity theory, supply-induced scarcity in the Nile is an increasingly salient element of interstate tensions and under unfavourable conditions will lead to violent conflicts (Homer-Dixon, 1999:48). Muramuzi (2011) further asserts that these unilateral developments, although a positive achievement for upstream countries' developments, are extracting more water than the Nile can provide. The projects will exert pressure on already exposed water beds downstream (as evidenced in the Nile's cataracts) and upstream. These uncoordinated developments will therefore result in lower water tables and rivers running dry due to unsustainable use (Van der Molen and Hildering, 2005:135).

4.3.3. Structural-induced scarcity: uneven distribution of water resources in the Nile River Basin

Due to competitive exploitation of international river basins, the geopolitical landscape has become tense. Consequently, disputes have become inevitable (Kliot *et al*,

[24] Located in east central Africa along the equator and borders the countries of Uganda, Kenya, and Tanzania

2001:230). However, there is an opposing view that in contrast to water scarcity in the NRB leading to conflict between upstream and downstream countries, however, the said scarcity is likely to force cooperation. Nonetheless, corporation in the NRB may only happen if the underlying cause of water scarcity was not the politics of distribution (Pakes, 2013:434).

One of the most controversial issues surrounding the Nile is access to water resources (UNEP, 2006:2−4). Water scarcity is not only a result of the amount or scale of rainfall, but also of the regimes that govern the Nile. Water usage between upstream and downstream riparian countries is unequal because of these regimes.

The use of the Nile has always been and remains a controversial issue. Water is already scarce in some parts of the basin. The current distribution of water in the area has serious global political consequences and is fundamental to the developmental processes of the respective countries (Oestigaard, 2012:25). This uneven distribution also bears many local political, economic and social implications.

According to Haftendorn (1999:10), the impact of resource distribution, specifically water, carries many political implications in local, state, regional and international spheres. In shared basins, the lower or upper-lying riparian country can control the quantity and quality of water flow by means of its military might and hydrological situation. Political actors may often also use resources as objects of military and political action in an effort to extend their influence in such regions (Conca *et al,* 2000:1).

An example of this is the defining influence of Egyptian foreign policy on states in the basin. Egypt, being the stronger party, provokes, initiates or prevails with military action against its weaker adversaries, thereby increasing the potential for conflict. The issue of controlling the Nile has been central to political decision-making in Cairo (Hassan and Rasheedy, 2011:149).

As an internationally shared river that extends across political borders, the Nile has created social, economic and political tensions also disputes between downstream and upstream countries relating to the distribution and use of the water. These include

the lack of beneficial agreements regarding the allocation of water (Conca *et al*, 2000:1).

Egypt's close relationships with a succession of major powers also helped it to exert its influence over the Nile. The United Kingdom (UK) until the 1950s, the Soviet Union until the mid-1970s and, currently the United States (US), have all provided political and financial support to cement Egypt's position in the basin, through legal treaties if possible. They have also simultaneously influenced the construction of infrastructure for power generation, storage and irrigation (Verhoeven, 2013).

The Nile therefore became subject to numerous agreements. Many bilateral treaties were concluded between Egypt, the UK and other foreign or European powers to regulate the use of the Nile's water (Okoth-Owiro, 2004:1). Egypt became important to the UK for the following reasons:

- Egypt, through its control of the Suez Canal, became the easiest and quickest way to India as opposed to the Cape of Good Hope.
- Egypt is strategically located between the UK and India. This strategic position became important for the UK to maintain communication with India.
- During the American civil war, the UK shifted its attention to Egypt for its cotton.
- The Nile River was presented as a source of water and flood control in the move from the traditional flood-fed methods of irrigation to an increased reliance upon perennial irrigation (Luscombe, 2012). In this instance, the UK, which had become reliant on the agricultural exports of the Nile region, saw the allocation between Egypt, British East Africa and Sudan as the means for irrigation (Knobelsdorf, 2006:5).

Godana (1985:176) also argues that to regulate European colonial rule over most of the Nile region, it became necessary to establish treaties and instruments that would attach the water rights and obligations within the basin to Europe. However, it is important to consider prior treaties regarding the use of the Nile, which culminated in the current nature and context of both the 1929 and 1959 agreements.

A series of agreements deemed responsible for structurally denying upstream riparian countries access to, and use of, the Nile include:

- the 1891 Protocol between the UK and Italy to demarcate their respective spheres of influence in Eastern Africa
- the 1902 Anglo-Ethiopian Treaty to delimit the frontier between Ethiopia and the Sudan
- the 1906 Treaty between the UK and the Independent State of Congo to re-define their respective spheres of influence in eastern and central Africa
- the 1906 Tripartite agreement and set of declarations between the UK, France and Italy
- the 1925 Exchange of Notes between Italy and UK
- the 1929 Agreements: Exchange of note between His Majesty's government in the United Kingdom and the Egyptian government on the use of the Nile for irrigation
- the 1959 Agreement: Agreement between the Republic of the Sudan and the United Arab Republic for the Full Utilization of the Nile.

These series of agreements shared the principle of protecting Egyptian interests in the Nile region. They stipulated that countries would not construct or cause to be constructed irrigation or any work that might negatively affect the flow of the Nile to Egypt. The UK, France and Italy argued that they were acting on behalf of upstream riparian countries. For instance, with the fear that the Italians, acting on behalf of Eritrea, may construct on the upper Nile, the UK warned Italy to avoid any access or construction on the Nile in exchange for the recognition of an Italian sphere of influence in the Ethiopian Highlands (Yacob, 2014).

Article 3 of the 1891 protocol sought to protect Egyptian interest in the Nile's Atbara River, the upper reaches of which were within the newly acquired Italian possession of Eritrea (Okoth-Owiro, 2004:6). Provisions of the article stated:

> The Italian Government engages not to construct on the Atbara, in view of irrigation, or any work which sensibly modify its flow into the Nile, (Degefu, 2003:95).

It was through this demarcation process that the UK, to assure the Italians' acquiescence, agreed to recognise Ethiopia as an Italian sphere of influence, thus formally denying Ethiopia its independence (Degefu, 2003:95).

Article 3 of the 1902 Anglo-Ethiopian Treaty stated:

> His Majesty the Emperor, Menelik II, King of Kings of Ethiopia, engages himself towards the Government of His Britannic Majesty not to construct or allow to be constructed, any works across the Blue Nile, Lake Tana or the Sobat, which would arrest the flow of their waters into the Nile except in agreement with his Britannic Majesty's Government and the Government of the Sudan, (Rubenson, 1991:302; Okoth-Owiro, 2004:7; Yihdego, 2013:1).

Article 3 of the 1906 Treaty between the UK and the Independent State of Congo stipulated:

> The Government of the Independent State of Congo undertakes not to construct or allow to be constructed any work over or near the Semliki or Isango Rivers, which would diminish the volume of water entering Lake Albert, except in agreement with the Sudanese Government, (Treaty Series no.4, 1906:c36; Okoth-Owiro, 2004:7).

The 1906 Tripartite Agreement, on the other hand, acted as a confirmation of the terms of the protocol between the UK and Italy, and the Anglo-Ethiopian treaty. The three parties recognised the principle of non-interference with the flow of the Blue Nile. Article 4 (a) of the tripartite treaty stated:

> France, Great Britain and Italy shall make every effort to preserve the integrity of Ethiopia, in an effort to safe guard the interests of Great Britain and Egypt in the Nile Basin, more especially as regards the regulation of the waters of that river and its tributaries, (Yihdego, 2013:1).

Under the 1925 Exchange of Notes between Italy and the UK, Italy recognised the rights of Egypt and Sudan in the Blue Nile, the White Nile and their tributaries. It agreed that it would not engage in any construction that might modify these rivers' flow into the main river (Okoth-Owiro, 2004:7). The UK interest was not limited to the river

alone, but included the control of the source, i.e. Lake Tana in Ethiopia, which is the largest lake. Italy stated:

> … we have noted Britain's determination to control the Blue Nile for the Benefit of Egypt and the Sudan, (Degefu, 2003:111).

According to Knobelsdorf (2006:5), these series of negotiations and understandings became what are known as the 1929 Nile Water Agreements.

4.3.3.1. The 1929 Exchange of note between His Majesty's government in the United Kingdom and the Egyptian government on the use of Waters of the Nile for irrigation.

The sole purpose of the 1929 Nile Agreements was to guarantee the 1920 estimates made by the Nile Project Commission, with representatives from India, the UK and the US (Lumumba, 2007:22). With the Nile Rivers' average flow of 84 billion BCM/yr, these estimates suggested that Egypt would need 48 BCM/yr and that Sudan's irrigation would survive on the Blue Nile alone, which accounted for approximately 4 BCM/yr. This left 32 BCM/yr unallocated (Wolf and Newton, 2008). Due to the fluctuation of the river, it was agreed that during any change in the flow, gain or shortfall, the Nile's water will be divided evenly between Egypt and Sudan (McCaffrey, 2003:265; Okoth-Owiro, 2004:8; Lumumba, 2007:12−13).

These estimates led to the Nile Waters Agreements on the allocation of water between Egypt and Sudan, also known as the Anglo-Egyptian Treaty. The 1929 Nile Agreements was signed on 7 May between Egypt and the UK (the then colonial master of Sudan) for the purpose of sharing the Nile's water. These agreements were signed as a means for both countries to engage in comprehensive large scale control of the Nile (Kieyah, 2007:7−8).

According to Dunoff and Trachtmann (1999:24), the agreements grant Egypt extensive use of the Nile. They stipulate that Egypt has a right to use the Nile and a property rule to protect this right. This gave Egypt exclusive propriety right to the Nile without obligation, consent or even voluntary transfer of property rights from Egypt to other riparian countries (Kieyah, 2007:19).

Through these agreements, Egypt was guaranteed a claim to the entire timely flow (from January to July); rights to on-site inspectors at the Sennar Dam built in Sudan; and that no works would be developed along the river or on any of its territory which would threaten Egyptian interest (Wolf and Newton, 2008). These agreements also granted Egypt power over any upstream countries' projects in the southern Nile that concerned the Nile, and Sudan was bound to Egypt's approval before undertaking any irrigation project.

To further Egypt's hegemony over the Nile, note 1, par. 4(b) of the agreements also required Sudan or countries under the British administration to obtain the consent of the Egyptian government prior to undertaking any irrigation work or installing electric generators. This part of the agreements concerned the quantity of water flowing into Egypt from the branches and lakes of the Nile (International Water Law Project, 2014a). It was another clear symbol of the UK's lack of representation and its compromise of its upstream colonies. According to Oloo (2007:101), in the process, Egypt was responsible for a number of major water projects that enabled it to acquire extensive control over the Nile by appropriating large portions of the Nile's water and bringing the flow within its sovereign jurisdiction.

The enactment of the 1929 Nile Agreements enabled Egypt to use note 2, par. 4 of the agreements (see Annexure D) to argue the following on the basis of natural and historical rights (Knobelsdorf, 2006:6):

> Her Majesty's Government in the United Kingdom has already recognized the natural and historical right of Egypt to the waters of the Nile....Her Majesty's Government in the United Kingdom considers the observance of these rights as a fundamental principle of the policy of Great Britain... (International Water Law Project, 2014a).

Although the 1929 Nile Agreements served as the basis for the principles of Nile water allocation, it did not guarantee the full use or exploitation of the Nile's water; hence the need for a revised agreement. The1929 Nile Agreements were revised on 8 November 1959 through the 1959 Nile Agreement.

4.3.3.2. The 1959 Agreement between the Republic of the Sudan and the United Arab Republic for the Full Utilization of the Nile Waters.

In 1959, Egypt and Sudan concluded an agreement. This bilateral agreement was entirely exclusive in that it allocated the entire flow of the Nile's water at Aswan to Egypt and Sudan, thus effectively excluding other Nile riparian states (Knobelsdorf, 2006:8; Lino, 2013:12).

Abseno (2013:146) argues that the Nile is recognised by the two countries as their respective historic and acquired rights. According to Caponera (1993:661) a nation enjoys the right to water that has been currently or historically used by that nation. Acquired rights according to Sinclair (1996:87), means a right acquired under law to impound, divert, or use water.

Contrary to the 1929 Nile Agreements, the 1959 Nile Agreement made reference to other riparian countries. Article 5, par. 2(a) (see Annexure E) states:

> As the riparian states, other than the two Republics, claim a share in the Nile waters, the two Republics have agreed that they shall jointly consider and reach one unified view regarding the said claims, (International Water Law Project, 2014b).

Ethiopia for instance, reserved its rights to the Nile in 1956, 1977 and 1980. Kenya, Uganda and Tanzania also reserved their rights in the *Nyerere Doctrine of Treaty Succession*, refusing to be bound by colonial-era agreements (Kliot, 1994:86). However, the agreed *unified view* of both Egypt and Sudan was to reject all these claims.

The adoption of the 1959 Nile Agreement replaced allocations set forth in the 1929 Nile Agreements and established a *joint* bilateral full use of the Nile's water between Egypt and Sudan (Demeke 2013). The two purposes mentioned in the introductory stipulations of the 1959 Nile Agreement specify both Egypt and Sudan's intentions to claim full control over the Nile's water and to make solid future claims on the Nile.

According to these introductory stipulations:

> The Nile River projects require for their execution and administration, full agreement and cooperation between the two Republics in order to regulate their benefits and utilize the Nile waters in a manner which secures the present and future requirements of the two countries; and, as the Nile waters Agreement concluded in 1929 provided only for the partial use of the Nile waters and did not extend to include a complete control of the River waters, the two Republics have agreed on the complete control of the River waters, (International Water Law Project, 2014b).

Nonetheless, the 1929 Nile Agreements remained the yardstick for the 1959 Nile Agreement. As such, the 1959 Nile Agreement did not differ much from the 1929 Nile Agreements and continues to render full control over the Nile to Egypt, with huge economic benefits and the bonus of hydropower (Allan, 1999:4−5).

In short, both agreements give Egypt and Sudan absolute rights to use 90% of the river's water, leaving the upstream countries to share 10%, which creates an unsustainable solution. This solution impairs developments in upstream countries, which are forced to abandon certain projects due to limited access to water, or to get approval from Egypt to use the Nile's water or construct water-related projects (Kameri-Mbote, 2007:3).

The 1929 Nile Agreements granted the vast majority of the Nile's water to Egypt, with 48 BCM/yr of the 84 BCM/yr total average of the Nile's water flow, and granted Sudan 4 BCM/yr. However, article 1, par. 1−2, and article 2, par. 3−4 of the 1959 Nile Agreement ensured that the unallocated 32 BCM/yr was also divided between Egypt and Sudan according to their respective needs (Wolf and Newton, 2008; International Water Law Project, 2014b).

According to these provisions, the average flow of the river is considered to be 84 BCM/yr. The agreement considered evaporation and seepage to account for 10 BCM/yr, leaving 74 BCM/yr to be divided between Egypt and Sudan. The agreement argued that Egypt's *acquired rights* would account for approximately 48 BCM/yr and Sudan would acquire 4 BCM/yr. The remaining benefits of

approximately 22 BCM/yr are divided by a ratio of 7½ BCM/yr for Egypt and 14½ BCM/yr for Sudan (International Water Law Project, 2014b) (see table 2).

Table 2: Water allocation from Nile agreements (Wolf, 1996:3)

Nile average flow = 84 BCM/year	**1929 Nile Agreements (BCM/year)**	**1959 Nile Agreement (BCM/year)**
Egypt	48	55.5 (48 + 7½)
Sudan	4	18.5 (4 + 14½)
	Leaving 32 BCM/year unallocated	Leaving 10 BCM/year for evaporation and seepage

As indicated in the agreement, these calculations are based on historical rights and acquired rights. It is difficult to determine, monitor and quantify the Nile River flow or its actual total annual flow, since it varies by season and year The average annual BCM used to argue the allocation in the agreement took expected seasonal fluctuations into account (Knobelsdorf, 2006:6−8).

Irrespective of the burden laid upon upstream countries to obtain Egypt's approval if they desired to develop projects, the 1959 Nile Agreement also made the process complex by requiring upstream countries to obtain approval not only from Egypt, but also from a technical committee on the basis of technical oversight and contractual supervision. Article 5, par. 1 and 2 of the 1959 Nile Agreement stipulates:

> If it becomes necessary to hold any negotiations concerning the Nile, with any riparian state, outside the boundaries of the two Republics, the Governments of the Sudan Republic and the United Arab Republic shall agree on a unified view after the subject is studied by the said Technical Commission, (International Water Law Project, 2014b).

The said unified view:

> shall be the basis of any negotiations by the Commission with the said states; and, If the negotiations result in an agreement to construct any works

> on the river, outside the boundaries of the two Republics, the joint Technical Commission shall after consulting the authorities in the Governments of the States concerned, draw all the technical execution details and the working and maintenance arrangements. And the Commission shall, after the sanction of the same by the Governments concerned, supervise the carrying out of the said technical agreements, (International Water Law Project, 2014b).

Reference to the Joint Technical Commission referred to here provides an important clause in these agreements because it technically relates to the management, development and utilisation of the Nile. Permanent Joint Technical Commission are established to secure the technical cooperation between riparians states (Mekonnen, 1999). It consists of four members from each country and has many similarities to the Canada-U.S. International Joint Commission. The functions of the PJTC are to: (a) develop projects to increase the yield of the NiIe, (b) supervise the execution of such projects as they are approved by governments, (c) draw up working arrangements for schemes to be constructed in either riparian countries, (d) supervise the operation of the mutually constructed works and. the related agreements and (e) devise and recommend to the governments, when and if required, an arrangement for an equitable reduction in water use in the event that a series of low flow years in the Nile basin reduces the flow below the average (Hodges, 1979:79)

According to Katz (2013:1256), although the 1959 Nile Agreement replaced, altered or updated the allocations in the 1929 Nile Agreements, it did not entirely replace the obligations of the 1929 Nile Agreements. The updated allocations were merely a response to the political and agricultural changes and demands since the signing of the 1929 Nile Agreements. Like the 1929 Nile Agreements, the legal consequences of the 1959 Nile Agreement are totally unacceptable (Demeke, 2013). For instance, following the 1959 Nile Agreement, Egypt's plans included substantially increasing its use of Nile's water. This was to overcome the challenges of increasing population growth and growing pressure over *old* lands in the Nile valley and delta (Cascao, 2009:249).

These challenges were addressed by expanding three major agricultural projects and a government policy of moving people out of these old lands into the newly reclaimed

lands in the desert where these projects were taking place (converting these deserts into land for agricultural and industrial development). These projects have been ongoing horizontally since the late 1990s and include the West Delta Irrigation Project, the North Sinai Agriculture Development Project, and the South Valley/Toshka Development Project, all of which aim to reclaim thousands of ha of land (Cascao, 2009:249).

Of significance is the South Valley/Toshka Project, which started in 1997 and has since attracted a high level of criticism from upstream riparian countries. This is mainly because the project aimed to reclaim 1.5 million acres of land estimated to require 5 BCM/yr of water. For upstream countries, this means that Egypt will use more Nile water than it is already using and attain legal rights to additional water allocations (Schilling, 2013).

Egypt's use of both natural and historic rights has constrained relations between upstream and downstream countries, since these rights are contradictory. Al-Din Amer (1997:381) expounds on these rights, arguing that the principle of prior appropriation or the international law principle of *absolute territorial integrity* (acquired rights) argues to *protect the rights of use for the country that puts the water into use first*. Therefore, downstream countries are given the power to accuse upstream countries of illegally taking measures that are disadvantageous to their interests. However, the principle of *absolute territorial sovereignty* (natural rights) regards water bodies as an integral part of the state's national territory, therefore protecting the sovereignty of countries within which watersheds, lakes and rivers originate.

Egypt has relied heavily on its military might to safeguard its position on these agreements and its rights to the Nile. For instance, in 2005 Egypt's military expenditure was more than twice the military expenditure of the other nine riparian states together (Adar, 2011:183) (South Sudan had not yet been formed). This is a clear reflection of how central the security of the Nile is to Egyptian military plans and Egypt as a whole. According to Yacobs (2004:2), the Egyptian High Command even went out of its way to establish contingency plans for armed intervention in each country in the NRB since they are all perceived as national security threats to Egypt.

These military plans, also known as *Waraa-elhidoud*, include handling direct threats to the flow of the Nile's water. Such behaviour can be traced back to the early 19th century when Muhammad Ali[25] was rebuilding the Egyptian army. However, today the Nasser Military Academy in East Cairo appoints full-time staff to review and adjust these military plans to changing modern circumstances (Yacobs, 2004:2). This is proof of Starr's (1991:19) argument that,

> water security will soon rank with military security in the war rooms of defence ministries.

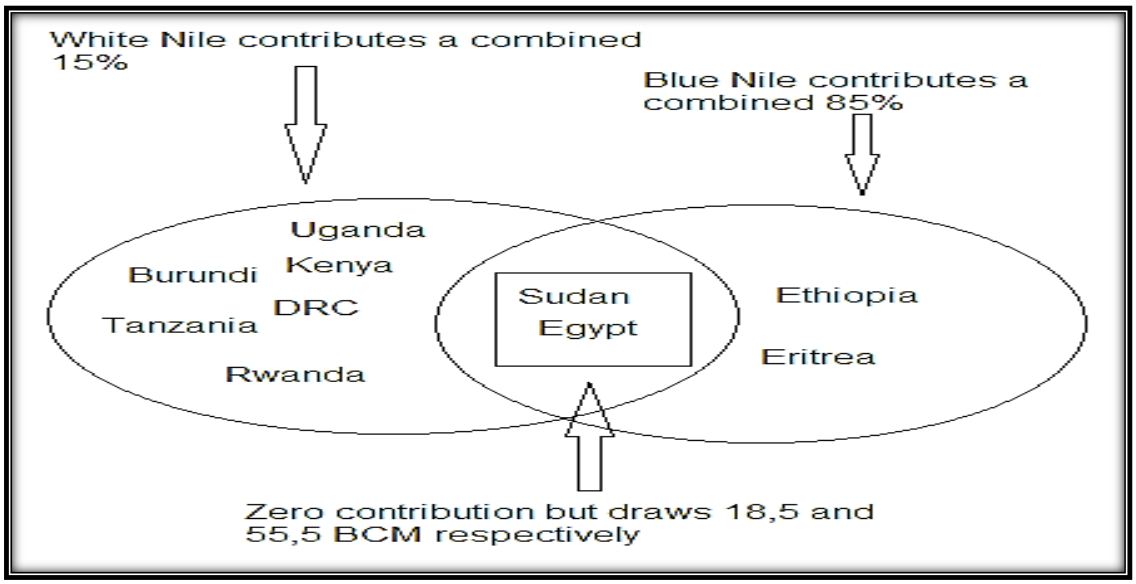
It is such behaviour that has forced both upstream and downstream riparian countries to a state of preparedness for war, in case there is one (Ashton, 2002:1).

Egypt has therefore structurally deterred upstream riparian states from using the Nile by these agreements (Chesire, 2010:13). This has left upstream countries in a position where they cannot develop or even get enough water to their people (Mayton, 2012). This is despite upstream countries being major contributors to the Nile's water (see figure 3). Ethiopia and Eritrea for instance, face challenges of droughts, famine and other severe implications that come with this lack of access to the Nile (Yacob, 2014).

However, any means to develop and use the Nile has resulted in bitter disputes between Egypt and upstream riparian countries. For instance, Ethiopia has pushed its demands to develop water resources in an effort to address its challenges through irrigation schemes and the construction of dams such as the Grand Ethiopian Renaissance Dam (GERD) (Rahman, 2011). The almost completed GERD, which is build right on the headwaters of the Blue Nile on the Ethiopian-Sudanese border, is intensifying insecurities or Egypt which receives 59% of its waters from the Blue Nile (Conniff, 2017).

[25] Founder of the dynasty that ruled Egypt from the beginning of the 19th century to the middle of the 20th. He encouraged the emergence of the modern Egyptian state. He is regarded as the founder of modern Egypt because of the dramatic reforms in the military, economic and cultural spheres that he instituted (Hourani *et al* 2004:71).

Figure 3: Contribution of upstream countries to the Nile



More importantly, filling the GERD could take approximately between five and 15 years. And during this fill, Egypt could experience a cut of 25% of the Nile' fresh water flow. Moreover, this is at the background of an already serious country-wide freshwater shortage in Egypt (Conniff, 2017).

This ultimately resulted in waves of disputes and tensions, as anticipated by the environmental scarcity theory (Homer-Dixon and Blitt, 1998:6; Homer-Dixon, 1999:4). These disputes and tensions are evident between Egypt and Ethiopia.

In 1977, Egypt threatened Ethiopia with war on numerous occasions. For instance, in the same year, Egyptian President Sadat declared:

> if Ethiopia proceeded there is no alternative but to use our force. We will retaliate when something happens but we have to be ready with plans and alternatives to firmly stop any action, (Adar 2011:182–3).

In May 1978, President Sadat warned:

> We depend upon the Nile 100% in our life, so if anyone, at any moment thinks to deprive us of our life we shall never hesitate to go to war because it is a matter of life or death, (Waterbury 1979:78).

In 1979 Sadat reiterated

> the only matter that could take Egypt to war again is water.

In 1991, former Egyptian Defence Minister Mohamed Hussein Tantawi Soliman also gave an assurance of Egypt's readiness to use force, if necessary, to protect its control of the Nile.

The militancy expressed by Egypt also relates to its dominance and stature at the World Bank, as the main financer of the NBI. Egypt is seen as pushing these international donor bodies. The World Bank has played a major role in denying other riparian states access to the Nile. In 2004, the Ethiopian Minister for Trade accused Egypt of using undiplomatic strategies to control Ethiopia's development projects on the Nile. He stated,

> Egypt has been pressuring international financial institutions to desist from assisting Ethiopia in carrying out development projects in the Nile basin, (Braune & Xu, 2010:232).

For instance, the World Bank opposed Ethiopia's intention to construct the GERD Dam. In 2009, during the Alexandria meeting, World Bank officials said they would not fund any projects without the approval of Egypt, stating,

> Egypt is the leading country in this consortium and the World Bank will not get behind any initiative that leaves them [Egypt] out, (Green Prophet, 2010; Mayton, 2012).

This was not the first time that Egypt had influenced financial institutions to desist from assisting Ethiopia. In 1990, Egypt blocked an African Development Bank loan to Ethiopia for new irrigation projects (Moffet, 1990:5).

On the other hand, Ethiopia's minister of water resources announced at a 1997 conference in Addis Ababa on the Nile River Basin Action Plan,

> as a source and major contribution of the Nile, Ethiopia has the right to have an equitable share of the Nile waters and reserves its rights to make use of its waters.

Ethiopia's foreign minister stated in 1998,

> there is no earthly force that can stop Ethiopia from benefiting from the Nile, (Shinn, 2006:3).

In 2004, Egypt restricted Tanzania from constructing the Lake Victoria pipeline claiming that, according to the 1929 Nile Agreements, Tanzania cannot construct any project without British permission. This project would have been of huge benefit to about 400,000 of Tanzania's north-western citizens. Egypt threatened to bomb the construction site arguing that it needed the water to flow northward into the Aswan Dam (Di Nunzio, 2013:6).

Although the nature of the 1959 Nile Agreement supposes a cooperative relationship between Egypt and Sudan, the latter also received its fair share of military threats from Egypt (Deng, 201:39). In June 1995, President Mubarak announced,

> Those who play with fire in Khartoum … will push us to confrontation, [to] defend our rights and our lives, (Swain, 2004:102).

Deng (2011:52-3) further argues that Sudan received more threats from Egypt than any other riparian country; hence, it is also subject to Egyptian manipulation and plots. This is highlighted by Egypt's interference in aiding the rebel Sudanese People's Liberation Army in southern Sudan (Klare, 2002:154).

Irrespective of these threats, it is evident that Ethiopia will stop at nothing to push for its share of the Nile. It is also evident that Ethiopia has lost confidence in the *"Do-no-harm"* agreement signed in 2015 between Egypt, Ethiopia and Sudan due to the agreement's lack of providing a formal agreement on how to share the Nile. And the absence of a formal agreement regarding the actual share of the Nile, particularly by Ethiopia, has appeared to only serve Egypt's' interests (Conniff, 2017).

It can therefore be concluded that these agreements have systematically denied upstream riparian countries access to the Nile by imposing obligations on their colonial administrations not to construct the Nile. For instance, Italy, acting on behalf of Eritrea and recognised as a sphere of influence in Ethiopia, agreed to these obligations. Belgium, acting on behalf of Burundi, the DRC and Rwanda, and the UK acting on behalf of Kenya, Tanzania, and Uganda, but excluding Sudan, also agreed to these obligations. This rendered Egypt control over the Nile while compromising these upstream riparian countries' access to the Nile.

Today, all these upstream countries are subject to the same obligations and, because of their lack of access to the Nile or the obligation not to construct the Nile, are faced with serious humanitarian and developmental crises. The UK's representation in all the above negotiations was meant to include the concerns of its colonies and mobilise upstream development (Paisley and Henshaw, 2013:5).

However, the upstream riparian countries reject this claim as these agreements were imposed on them and the populace had little input in designing or approving the agreements. The agreements served primarily Egyptian and a minor British-Sudan interest, thus binding the UK-controlled upstream riparian countries to Egyptian interests (Knobelsdorf, 2006:1−5).

In addition, treaties prior to the 1929 and 1959 agreements have played a huge role in the nature of both these agreements, such as *securing recognition of the principle that no upper-basin state had the right to interfere with the flow of the Nile in respect of Egypt,* (Okoth-Owiro, 2004:7). These agreements have been a source of structural-induced scarcities in the NRB.

The agreements outlined in this chapter provide an indication of the structural-induced scarcity as argued by Homer-Dixon's environmental scarcity theory. This is done in an attempt to provide the theoretical linkage for structural-induced scarcity and the potential for conflict in the NRB. This linkage is argued on the basis that property rights or other institutions are established to prevent access to water by other actors. The scarcity and grievances that may result can reinforce existing stress factors and play a role in inciting tensions and disputes (Homer-Dixon, 1999:48; UNEP, 2012:14). Tvedt (2004:480) argues,

> these water sharing treaties have kept Nile Basin countries into conflict over the regions' most precious resource.

China's involvement in the hydropolitical development of the Nile has also exacerbated structural-induced scarcity in the basin. According to Homer-Dixon (1999:48), structural-induced scarcity is a major cause of violent conflicts in that it deprives certain water users of access to water. Unilateral hydropower developments in upstream countries have also become a major source of structural-induced scarcity and result

in an unequal distribution of the Nile. Given that upstream countries are gradually becoming more powerful water users on the Nile, it is evident that in the near future they will confiscate a larger part of the Nile.

Although these unilateral developments have bypassed the colonial agreements that governed the Nile, they do not address structural-induced scarcity in a mutual sense; rather, they exacerbate it. Unilateral hydropower developments have increased the unequal distribution of the Nile. Because of these developments, Egypt will experience physical water scarcity (Martens, 2011:9).

The basis of the threats posed by unilateral hydropower developments upstream is that these projects severely affect the water allocation formula on which Egypt is heavily dependent, and has been for decades (Swain and Jamali, 2011:9). As argued before, Egypt's dominance of the Nile was detrimental to the peace and security of the region, but so are these unilateral developments. This chapter argues that an equitable allocation is only possible through a negotiated treaty.

Because Egyptian interests are not considered when constructing these projects, environmental studies to determine the impact of these developments on Egypt's water security are not conducted (Hegazi, 2011:33−4). As a result, the issue of uneven distribution will continue to grow rapidly. For instance, the hydropower station at the Karuma Falls[26] threatens the natural flow of the Nile (Muramuzi, 2011).

This may be the beginning of a new phase of competition over the use of the basin's transboundary water resources. The following section will determine the existence and effectiveness of regimes in the Nile region, which are essential to addressing the demand, supply and structural-induced scarcity challenges.

[26] Uganda

4.4 Regime Theory: An analysis of regime formation and capacity in the Nile River Basin

The Nile has been subject to numerous water-related disputes and confrontations over disputed governance (Sinnona, 2012:3). According to Paisley and Henshaw (2013:1), it faces a complex array of governance challenges. The continued mismanagement of the Nile and its disproportionate distribution increases the likelihood of tensions and disputes. Therefore, protecting, managing and sustaining water and watersheds through proper water use is critical for every state, company and community.

Garretson (1960:144) has also argued that an NRB authority or administration is essential to addressing the problems relating to the full development and use of the NRB. According to Kukk and Deese (1996:22), river basin organisations are essential for all riparian countries to voice and resolve water issues without resorting to force.

Without these organisations, political tensions and disputes along shared rivers tend to emerge (Kukk and Deese, 1996: 22). This is evident in the case of the NRB. The depletion, degradation and political tensions and disputes in the NRB are due to the absence, or lack of capacity and capability, of a river basin organisation that mediates and ensures cooperation in the rational planning, conservation and development of the resources of the basin as a whole (Godana, 1985:264).

There hasn't been much successful regime formation or regime success in the NRB. Regime formation in the Nile region has been limited due to a number of factors, which have also limited their successes. One of these factors is the lack of inclusive participation by Nile riparian countries, solely because of the dispute about the rights over, and/or utilisation of, the Nile. An example of this is UNDUGU, which was formed to provide a forum for information sharing and to serve as an institution for sharing expertise and further allowing the riparian countries to become accustomed to treating the Nile as a whole, and not as less than the sum of its national parts (Paisley and Henshaw, 2013:6).

Despite the meaning attached to UNDUGU (*brotherhood* in Swahili), it didn't appeal to many riparian states as a form of brotherhood. UNDUGU was formed in 1983 at

Egypt's request and included all Nile riparian countries except Kenya and Ethiopia, which participated as observers. The goal of UNDUGU was to foster economic, social, cultural, and technical understanding. Although individual Nile riparian countries may have been motivated to participate for varying reasons, some argued that while many of them were interested in fostering self-reliance and African inter-dependence, for Egypt, UNDUGU was a means to further extend its hegemonic influence across the Nile basin (Paisley and Henshaw, 2013:6).

Today the Nile has become a recipe for conflict in the region over the demand, degradation and distribution of water resources. The fact that the Nile, as an internationally shared watercourse, moves across state boundaries and is a source of life for surrounding communities, yet is unevenly distributed, raises numerous red flags for the potential of conflict (Urdal, 2005:419). It is in this context that we need to critically analyse the role of a regional authority as a critical remedy.

The AU and the NBI both represent possible mechanisms for the sustainability, management and use of the Nile. On the one hand the AU, as a regional authority that has as its central role a focus on resolving issues detrimental to peace and stability on the continent, needs critical analysis as a successful mechanism of mediation. Rahman (2011) argues that in the past, a number of ethnic and tribal issues, land disputes and acquisitions in which the AU could easily mediate have dominated Africa's interstate conflicts.

On the other hand, the NBI poses as a successful mechanism on the basis that it is an inter-riparian commission aimed at coordinating both upstream and downstream interests. According to Lamere (2012), the NBI is the first contemporary attempt to forge a collective water sharing agreement. It is the only legal framework for regional environmental management covering all 11 Nile riparian countries. Therefore, the NBI is of critical importance to this chapter.

The NBI's vision further makes it an ideal and important regime to address the use and management of the Nile. Its vision states,

> to achieve sustainable socioeconomic development through the equitable utilization of, and benefits from, the common Nile Basin water resources.

Its characterisation of the NRB's water resources as *common* refutes the notion that Egypt and Sudan have priority use of the entirety of the basin's flow (Stoa, 2014:1358).

According to Godana (1985:264), basin states can only gain through the creation of a comprehensive commission serving as an institutional vehicle for cooperation. Nonetheless, Jacobs (2012:120) considers it worth noting that multilateral cooperative arrangements are not the only solid footing by which cooperative norms can be achieved. He pointed out that the institutional design of multilateral agreements can either help or hinder the way in which actors behave as a collective. The following section of this chapter will therefore illustrate Jacobs' (2012:120) assertion by discussing the role of the AU in mitigating the Nile dispute.

4.4.1. Continental context

4.4.1.1. African Union

The AU has acknowledged the causal relationship that exists between environmental scarcity and conflicts (Van Wyk, 2010:3). It has also outlined crucial steps in the preservation of natural resources (African Union, 2003:4). Its environmental regime is one of its oldest. One of the earliest conventions adopted in 1968 by the AU's predecessor, the OAU, is the African Convention on the Conservation of Nature and Natural Resources (the convention). It emphasised the adverse impact of environmental change on human security (Van Wyk, 2010:9−11).

The convention's fundamental principle outlines measures by which member states can conserve, use and develop land and soil, water, flora and fauna resources in accordance with scientific principles and with due regard to the best interests of the people (Van Wyk, 2010:9). This chapter takes an interest in the provisions made by the AU regarding the conservation, use and development of land, soil and water since the degradation of these resources are paramount to the depletion of the Nile.

Firstly, *Article IV on Land and Soil*, in sections 1, 2, 3 and 4 of the convention states that it:

> ensures to prevent land degradation through implementing land tenure policies to: establish land-use plans based on scientific investigations; implement agricultural practices and agrarian reforms; improve and introduce soil conservation, sustainable farming and forestry practices; and, control pollution and erosion caused by agricultural activities, mining and the disposal of wastes, (African Union, 2003:6).

Secondly, *Article V on Water*, in sections 2 and 3 of the convention propose considerable provisions for preserving water and minimising the possibility of water-related disputes in transboundary basins. Section 2 states:

> The parties shall establish and implement policies for the planning, conservation, management, utilization and development of underground and surface water, as well as the harvesting and use of rain water, and shall endeavour to guarantee for their populations a sufficient and continuous supply of suitable water, (African Union, 2003:7).

According to section 3:

> Where surface or underground water resources are shared by two or more of the contracting states, the latter shall act in consultation, and if the need arises, set up inter-state commissions to study and resolve problems arising from the joint use of these resources, and for the joint development and conservation thereof, (African Union, 2003:7).

On the other hand, in addressing water security, the AU has also adopted Water Vision 2025. In this vision, the AU acknowledges,

> water can be a matter of life and death, that when too much or too little, it can bring destruction, misery and death, (African Union, 2000:3).

Another environmental initiative of the AU includes NEPAD. The initiative's focus includes eight priority sectors that range from combating land degradation to the cross-border conservation of natural resources. Through NEPAD, the AU has recognised the importance of the UN framework conventions for climate change, which obliges countries to meet current climate change commitments and future negotiations.

Also significant to the AU's conservation of natural resources is the 2004 Sirte AU decision on the challenges of implementing integrated and sustainable development

on agriculture and water in Africa (Adar and Check, 2011:87). Moreover, the AU Commission has been successful in uniting river and Lake Basin authorities under the auspices of the African Network of Basin Organisations (ANBO). This is evident in the development of legal instruments regarding cooperation for sustainably managing rivers and lakes (Obengo, 2016:99).

Nonetheless, tensions between upstream and downstream Nile riparian countries persist, despite such protocols and the fact that the Nile has changed the landscape, politics and relations among the basin countries. This is mainly due to the deadlocks faced by the organisation. These include:

- the over-emphasis of the structural scarcity over the demand and supply scarcities
- the provision of an ideological solution rather than a sustainable inter-riparian solution
- the power relations between upstream and downstream countries within the AU
- third party involvement and foreign aid dependence.

These deadlocks are discussed below in detail.

4.4.1.1.1. Structural-induced scarcity over demand and supply-induced scarcities

Despite the provisions of the convention, the NRB countries are still confronted by the challenge of land degradation. Each riparian country experiences different levels of degradation (Di Nunzio, 2013:6). The inability of the AU to combat land degradation has continued to increase the potential for conflict in the NRB as people are forced to migrate to other regions, competing over already scarce resources.

When people begin to use natural resources unsustainably, their resource base disappears quickly with overwhelming effects on local, national and regional stability (Baecher *et al*, 2000:18). The AU has not addressed the underlying issues of demand and supply scarcity in the NRB. This is despite its position on land and soil and shared

water resources; its pursuit of the establishment of regional organisations to deal with shared water resources conflicts; and its recommendation to set up inter-state commissions (Chesire, 2010:64; Kagwanja, 2007:332).

The commission has been focused on the adverse impact that the distribution of the Nile (upstream-downstream disputes) has on the peace and security of the region and has done little to consider factors detrimental to the degradation and depletion of the Nile, either between and/or within upstream and downstream riparian countries. This is despite demand, supply and structural-induced scarcity not being mutually exclusive; they often occur simultaneously and interact with one another (Homer-Dixon, 1994:8−11).

> Uneven distribution never acts on its own; its impact is always a function of its interaction with resource demand and supply, (Schwartz *et al*, 2000:80).

An important AU institution vis-a-vis the impact of environmental change on human security is the Peace and Security Council (PSC). The PSC is bestowed with major powers and authority, which could be used to address the impact of environmental change on natural resources conflict on the continent. However, this institution is underutilised (Van Wyk, 2010:11).

It serves little, if any, purpose to focus entirely on addressing unequal distribution when water resources continue to diminish due to demand and supply-induced scarcities. The outbreak of environmental conflict is complex. Environmental scarcity emerges within a political, social, economic, and ecological context and interacts with many of these contextual factors to contribute to violence (Percival and Homer-Dixon, 1998:279).

4.4.1.1.2. Political ideology rather than a sustainable inter-riparian solution

According to Chesire (2010:v), the AU has not played a significant role in resolving water disputes between the Nile riparian countries. The AU's efforts to address the structural scarcities in the NRB have been ideological rather than providing for a

sustainable inter-riparian solution. The former AU Chairperson Dr Nkosazana Dlamini-Zuma advocates,

> On the road to negotiations or cooperation, Ethiopia and Egypt should look at the win-win situation in a new context, that is, not in the context of colonial powers, but in the context of Pan-Africanism and African Renaissance, (Fanowedy, 2013).

This appears to be an indictment against the AU since it seems to focus on political ideology as opposed to truly creating a win-win scenario between the Nile states based on actual material gain. Such ideological posturing means little when upstream riparian countries need water for domestic and agricultural use.

To achieve a sustainable solution based on win-win gains, Egypt must give up part of its Nile shares, given the needs of other riparian states. However, regarding the current zero-sum scenario, there is lack of clarity on what the AU regards as *achieving a win-win situation not in the context of colonial powers*. The AU fails to clarify whether this means drafting a new water sharing agreement (Fanowedy, 2013).

The unaddressed unilateral actions and zero-sum strategy are very critical to the emergence of environmental conflicts (Kukk and Deese, 1996:22). This argument is in line with the simple scarcity conflict model. The model argues that water becomes scarce at a time when each state demands unhampered access to it. Despite several political and socioeconomic elements being linked to conflict, the zero-sum strategy is central to environmental conflict (Homer-Dixon, 1991:106; Homer-Dixon, 1994:18−20).

Benvenisti (1996:400) argues that it has become difficult for a common action to institutionalise because Egypt has made the Nile a private good. As such, the Nile has been classified as an excludable and rival good (Homer Dixon, 1999:48). Therefore, to ensure a transition from rival to non-rivalry, an established commission or organisation must help riparian countries realise their shared interest in the water resource that guarantees win-win gains, and address their claims to water rights or historic rights that both upstream and downstream countries tend to make (Okoth-Owiro, 2004:28). Such a commission or institution should also refrain from political ideologies that often result in more cleavages.

4.4.1.1.3. Power relations between upstream and downstream riparian countries within the African Union

With many riparian countries gaining independence in the late 50s and 60s, concerns about the validity of the 1929 and 1959 agreements intensified. For instance, Ethiopia, Tanzania and Kenya expressed their refusal to be bound by what they see as colonial-era agreements (Carroll, 1999:279). Other upstream riparian countries have failed to refute the validity of these agreements due to challenges such as resource excess, lack of capacity, prolonged periods of unrest and civil wars.

The above are among other salient features of these countries' failure to address the Nile water issue, thus compelling their administrations to focus on day-to-day survival and not on planning the development of their countries' water resources (Godana, 1985:84). This is the case with Uganda and the DRC. These countries have not taken a firm stance against the validity of the Nile Waters Agreements despite their active role in the Nile Basin Cooperation discussions.

In its defence, Egypt argues that colonial treaties are binding on successor states (Godana, 1985:143). However, whether states invoke the doctrine of universal succession, which implies that treaties are binding on successor states (Emanueli, 2003:1279) or the clean slate doctrine, which argues for states not inheriting the treaties or obligations of a predecessor state (Beato, 1994:534-5), has been a controversial issue. States have been known to invoke whichever doctrine suits them, especially stronger/powerful states that want to force weaker states to follow the doctrine that is in the powerful state's interest. It is evident that states have set no clear standard that could be called a custom or accepted principle of international law (Cowger, 1985:292).

Despite its current participation and interest in cooperative renegotiation and development with upstream countries, Egypt still holds that the 1929 and 1959 agreements should continue to serve as valid yardsticks and as controlling international legal instruments for managing the governance of the Nile (Caroll, 1999:279). Sudan has followed Egypt in matters relating to the Nile and has benefited

from Egypt's claim over the Nile (Lie, 2010:14−18).The formation of South Sudan in 2011, however, did not have any effects on Sudan's position on the Nile politics.

Both Egypt and Sudan have expressed a desire to maintain the status quo of the Nile concerning the management, use and development as rooted in previous agreements. For instance, Egypt is very reluctant to accept and quantify allocation claims by upstream countries and argues its share as a matter of national security. Egypt and Sudan had revised the 1929 Nile Agreements as an indication that its provisions were no longer representative of Egypt and Sudan's interest due to the changing political and economic landscape.

Upstream countries want to revise both these agreements as they claim that these agreements are not representative of their political and economic interests. The failure by the AU to mediate both the upstream and downstream claims raises a serious question. Which doctrine does the AU recognise as the best standard or state practice?

The AU has failed to support upstream countries in their rejection of both the 1929 and 1959 agreements. The failure of the AU to support upstream countries and challenge the exploitation of the Nile by Egypt owes much to its position on the upstream-downstream debate. For instance, the AU is reluctant to provide an effective response or solution as the AU secretariat, the African Union Commission, is based in Addis Ababa, Ethiopia, but is financed by Egypt as the financial backbone of the AU project (Patel, 2013).

Arab states, and Egypt in particular, contribute 15% to the AU's general budget. Key members of the Arab League continue to support the position taken by Egypt. Therefore, any action against either Ethiopia or Egypt could prove very costly for the AU. This has caused internal challenges of power relations within the AU (Eriksson and Zetterland, 2013:38).

4.4.1.1.4. Third party involvement and foreign aid dependence

The AU faces challenges in addressing issues detrimental to the Nile cooperation, peace and security agenda due to its financial dependence on foreign donors. Third parties become active players in environmentally-induced conflicts through the creation of insensible policies and programmes. The role of third parties, such as the World Bank, continues to create a rupture between the project planners and those individuals directly affected by its construction or implementation.

The involvement of third parties in the form of foreign aid donors such as the World Bank, the US and Canada in environmental conflicts further complicates the issues of political, social and economic interests, and hinders regional cooperation. For instance, the construction of the new AU headquarters was funded by China and African countries pay for only about 40% of the AU's budget. China, the EU and the US pay for the rest (Al Jazeera, 2013).

According to Deputy Chairperson of the AU Erastus Mwencha,

> The AU has been finding itself in difficult situations since the finances from donors almost always come with strings attached. It's not possible that the partners will always align themselves to your priorities. That is always the danger you face. Partners have got their biases and rightly so. And this is one of the things many of us have been saying. You may find partners preferring certain areas of cooperation (Al Jazeera, 2013).

The presence of a complex array of foreign or external actors in mediation processes tends to dictate and influence the decision-making agenda of regional organisations. This deflects them from the interests of the parties concerned and, consequently, constrains the decision-making freedom of the respective leaders or states. The cooperation framework pursued is ultimately obscured. At some point or the other, African states, and Nile riparian countries in particular, need to be politically and financially supportive, responsible and accountable to their peace and security mechanisms (Ong'ayo, 2008:4). Otherwise, the AU will fail to achieve the difficult goals of conflict resolution and regional cooperation in the NRB (Foulds, 2002:2).

The following section of the chapter discusses the role of the NBI in mitigating the Nile disputes. This section builds on Jacobs' (2012:120) previous assertion,

> institutional design of multilateral agreements can either help or hinder the way in which actors behave as a collective.

4.4.2. Basin-wide context

4.4.2.1. Nile Basin Initiative

The changing geopolitical environment has influenced the development of interstate mechanisms to deal with potential conflict over water in volatile transnational water resources. A number of regional frameworks have been established in recent years to address environmental conflicts within transboundary basins. For instance, the Lake Victoria Basin Commission undertook to develop the Lake Victoria Environmental Management Project, designed to restore the degraded lake ecosystem, manage shared water and watersheds, and point out source pollution (Mbaiwa, 2004:1323).

Several initiatives were proposed for the NRB; however, they were not inclusive, institutionalised and structured mechanisms that could bring together all riparian countries to address a common agenda. According to Wolf and Newton (2008), from 1967 to 1992, the UNDP supported the Hydromet Project designed to collect hydrometeorological information within the basin.

Based on the findings of this project, the Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin (TECCONILE) was formed in 1993 with the idea of creating informal dialogue between riparian nations. TECCONILE later resulted in the creation of the Nile River Basin Action Plan in 1995 to ensure joint planning in the use and development of the Nile's water (Wolf and Newton, 2008).

In 1997, the World Bank allowed the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM) to direct and coordinate donor activities within the basin, which led to Nile-COM working in cooperation with organisations such as the UNDP,

the World Bank and the Canadian International Development Agency (CIDA) (Wolf and Newton, 2008).

According to Paisley and Henshaw (2013:9), the major stumbling block was, and continues to be, the issue of water security and existing treaties. For instance, Egypt and Sudan still argue on the basis of the 1959 Nile Agreement. Despite the failure to resolve this issue, the NBI was established. However, water security has thus far proven to be a significant impediment to moving beyond the transitional NBI to a permanent agreement. As a result of these stumbling blocks, in February 1999, the water ministers of nine of the then ten Nile riparian countries agreed to replace TECCONILE with the NBI.

This signalled a major step by riparian countries to move to a more inclusive and comprehensive cooperation platform. The NBI[27] had the task of managing a complex river system faced with conflictual hydropolitics (Guvele, 2003; Othieno and Zondi, 2006:1). The NBI is a 10-member regional intergovernmental partnership, with Eritrea holding an observer status. These members include Burundi, Egypt, Ethiopia, Kenya, Rwanda, Tanzania, Uganda, the DRC, Sudan and the newly founded South Sudan (Balleh, 2014).

Nile-COM is the highest decision and policy-making body. It is comprised of the ministers in charge of water affairs in each of the NBI member states. This decision-making body receives technical support and advice from the Nile Technical Advisory Committee on matters related to the cooperative management and development of the common NRB water resources. The advisory committee is comprised of senior governmental officials, two from each of the member states (*Nile Basin Initiative*, 2013).

As a regional intergovernmental partnership, the NBI seeks to develop the Nile in a cooperative manner and establish a comprehensive framework to plan, manage and

[27] Also referred to as the Entebbe Treaty or Entebbe Agreement because it was signed and is based in Entebbe, Uganda; the NBI chair rotates among its members (Lie, 2010:13)

use the natural resources of the Nile, principally water (Oloo, 2007:95). The NBI also aims to include all members through participatory processes of dialogues (Wiebe 2001:751; World Bank, 2008:2). The initiative was launched with the understanding that a cooperative effort in developing and managing the Nile will bring the greatest level of mutual benefit to the region. It was through this inclusivity that an understanding of the implications of member states' actions on neighbours, and opportunities for managing risks and realising tangible benefits were created (Balleh, 2014).

The NBI is determined to oversee the cooperative, substantial socioeconomic benefits and regional peace and security framework of the NRB (*Nile Basin Initiative*, 2014). However, the NBI is faced with challenges detrimental to its effectiveness within the region. These include: the challenges of transforming the NBI into a permanent Nile River Basin Commission (NRBC); the stalemate in its Cooperative Framework Agreement (CFA), which aims to replace the colonial-era treaty that gave Egypt and Sudan a majority share of the Nile's water; third party involvement and foreign aid dependence; and unilateralism in policy decision-making. These challenges are discussed below in detail.

4.4.2.1.1. Challenges to transforming the Nile Basin Initiative into a Commission

The NBI is currently serving in the capacity of an interim organisation that has the authority and means to facilitate a more permanent legal and institutional arrangement to regulation the Nile (NRBC) (Kassa, 2013). As such, the NBI is just a transitional mechanism that is expected to phase out when a permanent NRBC is established following the conclusion of the CFA (Balleh, 2014). The CFA establishes the principles, operational mechanisms and setup of the NRBC to facilitate and oversee the smooth equitable and reasonable use, management and protection of the Nile's water. The CFA should be included in national legislation, thus disbanding the NBI and simultaneously establishing a permanent NRBC (Lie, 2010:11).

For the initiative to convert into a commission, six of the 11 countries' parliaments must ratify the CFA as law. Ethiopia and Rwanda have done so. Tanzania, Burundi and

South Sudan are waiting for ratification. The Ugandan parliament is expected to vote on it soon. In Kenya, the law is at cabinet level (Staff Reporter, 2014). In short, the NBI needs a legal status to become a permanent NRBC (Lie, 2010:2).

Transforming the initiative into a commission entails a different level of competencies. For instance, when the initiative converts into a commission, it will secure financial support from its development partners and will enable financial support by having its own revenue generation scheme. The NRBC will ensure the use of the Nile by member states on a legal basis (Kassa, 2013).

The establishment of an interstate commission (the NRBC) complements article V(3) of the AU convention on the conservation of nature and natural resources. This constitutes a departure from the past trend of unilateral water use and management, particularly in emphasising the issues of fair water allocation, joint management and developing resources (Lie, 2010:11). This also signals a fundamental shift in the status quo of upstream–downstream relations, particularly in the relationship between Egypt, Sudan and Ethiopia (Lie, 2010:11).

So far the NBI has not achieved its goal of being transformed into a commission. The CFA faces a stalemate due to conflicting arguments between upstream and downstream riparian countries regarding some of its provisions, thus delaying the establishment of a basin commission (Waslekar, 2013:7) (see. 4.4.2.1.2 below).

Since a basin commission has not been established, the basin is currently administered by the NBI. However, failing to establish a commission and having to deal with an initiative raises challenges for the full development and use of the Nile. For instance, an initiative has no legal status and, as a result, it cannot make binding and enforceable decisions. It can only enjoy financial support from development partners. This means having to rely on unconventional donors. Moreover, the impasse experienced in the CFA that is supposed to transform the NBI into an NRBC has threatened this support from development partners, which makes future support uncertain (Balleh, 2014).

4.4.2.1.2. Dispute over the Cooperative Framework Agreement

The CFA is an important example of a multilateral agreement that hinders the way in which actors behave as a collective. The NBI proposed a CFA that would include all the Nile riparian countries and incorporate the principles, structures and institutions of the NBI. The CFA aims to provide legal principles to determine reasonable and equitable solutions for sharing the Nile among the basin states, and to guarantee the water security of the Nile riparian countries (Lie, 2010:11; Salman, 2013:20 −21).

The articles of the agreement include general aims and principles of protection, equitable and reasonable use, prevention of significant harm, community interest, data and information exchange, peaceful resolution of disputes, conservation and sustainable development of the Nile (Jacobs, 2012:121; Salman, 2013:21).

Since its formation, the agreement has faced major complexities. The current status of the CFA is disputed among the Nile riparian states. Lino (2013:13) asserts,

> These complexities manifest themselves in the failure, thus far, of the basin countries to reach an agreement on an inclusive CFA, more than ten years after the start of the facilitative efforts under the NBI.

These difficulties are a result of the respective positions of the upstream countries on the colonial treaties, as well as the Egyptian and Sudanese claims to what they see as their acquired uses and rights of the Nile. Even the ministerial meetings that took place in Kinshasa, Alexandria and Sharm El-Sheikh in 2009 and 2010 failed to resolve these differences (Salman, 2013:20), leaving the CFA ineffective and in a stalemate.

The CFA owes much of this stalemate firstly to the contradiction and controversy caused by its principles, and secondly to the conflicting positions regarding rights and provisions on the use of the Nile, particularly in articles 4 and 14(a) (see Annexure F) (Waslekar, 2013:7).

Salman (2013:21) argues that the agreement causes contradictions and controversy between upstream and downstream countries by including both the principles of *prevention of causing significant harm to other basin states* and *equitable and reasonable u*se. The latter entails:

> The state whose use causes harm to other basin states, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of the CFA on equitable and reasonable utilization, in consultation with the affected state, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

As a general rule, upstream countries are likely to favour the equitable use principle because it provides more scope for states to use their share of the watercourse for activities that may impact downstream countries, while downstream countries will favour the no-harm principle since it protects their existing uses against impacts resulting from activities undertaken by upstream countries (Salman, 2013:21).

According to Article 4:

> [The] Nile Basin States shall in their respective territories utilize the water resources of the Nile River system and the Nile River Basin in an equitable and reasonable manner. In particular, those water resources shall be used and developed by Nile Basin States with a view to attaining optimal and sustainable utilization thereof and benefits there from, taking into account the interests of the Basin States concerned, consistent with adequate protection of those water resources. Each Basin State is entitled to an equitable and reasonable share in the beneficial uses of the water resources of the Nile River system and the Nile River Basin, (International Water Law Project, 2014).

Article 4 is essentially about *equitable and reasonable use* of the Nile. Article 4 takes into account the equitable and reasonable use of both the water resources of the *Nile River System* and the *Nile River Basin*. What this means, respectively, is that the Nile River System allows for the equitable and reasonable use of *only the water that runs into the river*, while the Nile River Basin refers to and allows for the equitable and reasonable use of *all the water resources of the Nile* (Al-Ahram weekly, 2015).

> Nile basin states agree in the spirit of cooperation, not to significantly affect the water security of any other Nile basin state (Mbaku and Mwangi, 2015).

Egypt and Sudan on the other hand, want article 14 amended to reflect their historic rights. On the basis of article 14, Egypt and Sudan argue,

> Nile basin states agree, in a spirit of cooperation, not to adversely affect the water security and current uses and rights of any other Nile basin states (Sudan Tribune, 2008; Salman, 2013:21).

Egypt required the CFA to acknowledge the 1959 Nile Agreement rather than to supersede it (Lie, 2010:11). This has resulted in the current stalemate in the NBI cooperative framework. The danger of not agreeing on the CFA is the threat to the emergence of the NRBC as indicated earlier. In this way, the institutional design of the CFA has hindered the way in which actors behave as a collective as far as its articles are concerned.

In addition, the upstream-downstream position causes conflict for the CFA with claims of historical and natural rights over the use of the Nile (Kendie, 1999:145). On the one hand, upstream countries have insisted this framework must disregard all previous agreements to which they were not part. Downstream countries seek a new framework to incorporate such earlier agreements. This has caused more disparities within the region (Oloo, 2007:101).The challenge was acknowledged by Beyene when he stated,

> an important challenge the Nile Basin countries are facing is related to establishing a permanent legal and institutional set-up to anchor their cooperation on a solid footing, (Rutagwera, 2014).

This means that the agreement, once effective, will transform the NBI into a permanent NRBC (Steinbrueck, 2014:11). According to Othieno and Zondi (2006:2−3):

> The agreement is also expected to provide a resolution to such issues pertaining to the balance between who has the historic right to the Nile, and issues of sovereign water rights especially with regards to where the river ought to be controlled, whether that be upstream or downstream.

This will eventually allow the status quo governing Nile water treaties to be rectified, and enable the Nile riparian countries to develop a common position on the equitable exploitation and use of the NRB resources. In this instance, the agreement has not addressed the equitable and reasonable use of the Nile, which would resolve the disputes between upstream and downstream riparian countries and develop a community of interest.

4.4.2.1.3. Third party involvement and foreign aid dependence

Although the AU has expressed interest in endorsing the NBI, it is unclear whether this stance emboldens or deters the World Bank, the International Monetary Fund or other foreign donors from getting involved (Ferar, 2010:91−92). The NBI faces similar challenges in terms of involvement and funding by foreign donors (Foulds, 2002:2). It is evident that foreign donors (World Bank and CIDA) have been involved in the funding process that led to the establishment of the initiative (Wolf and Newton, 2008).

These are the same donors that obscure the cooperation framework in the NRB and therefore dictate the agenda of water cooperation in favour of technical rather than political interventions such as preventative diplomacy. These technical interventions for instance, include the World Bank's intervention to stop Ethiopia from building the GERD, or the refusal of funding for building this project. This ultimately protects Egyptian hydro-hegemony (Othieno and Zondi, 2006:3).

Executive Director Engineer Teferra Beyene has also acknowledged the financial challenges faced by the initiative. However, instead of Beyene motivating riparian member states to take financial responsibility for the initiative rather than depending on foreign aid, he acknowledges the latter. This is harmful to policy-making since third parties are constantly involved and influence important decisions of the initiative.

During the Chinese delegation on a China-Africa transboundary water study tour on 7 May 2014, Beyene stated:

> The biggest challenge the NBI faces now, is lack of finance to implement the investment projects it has prepared and ensuring its institutional sustainability to continue providing the excellent services it has been providing for its member states. I believe the partnership that NBI has recently started with the Republic of China will help in filling some of these gaps as China is a key partner in Africa's bid, (Rutagwera, 2014).

This statement signifies a deeper entrenchment into foreign aid dependence.

4.4.2.1.4. Unilateralism in policy decision-making

The NBI faces challenges of addressing the unilateralism that exists in decision-making processes and laws governing the Nile. As has been argued, Egypt as the hydro-hegemony dominates and dictates these decision-making processes, which therefore remain in favour of Egyptian interests. This is evident in the CFA where the initiative has failed to resolve the stalemate due to conflicting rights at the expense of win-win gains. Progress on a cooperative framework constantly fails to materialise due to Egypt's disapproval. Therefore, these excessive unilateral actions pose a challenge to achieving cooperation that is mutually beneficial (Link *et al,* 2014:4−9).

It has been argued that the failure by the NBI to address unilateralism in its policy decisions lies in its having involved only water technocrats in the process, rather than invoking an institutionalised political will from the riparian states. This reduces it to a mere water authority. It lacks a political centre and a presence in the public eye of participating states. Without this political will, the issue of the equitable use of the Nile is impossible and faces a number of political compromises (Oloo, 2007:101−104).

This unilateralism prompts competition, leading to lose-lose gains and the failure of the NBI. The inability to establish the NRBC will exacerbate unilateral decision-making by riparian states regarding major water resource investment projects (hydropower projects) and therefore increase the level of disputes in the region.

4.5 Findings and concluding remarks

As opposed to the case of the OSRB presented in the previous chapter, the NRB is a classic case of *upstream vs. downstream* and *equitable use vs. no significant harm* scenarios. In the NRB, both upstream and downstream countries have been in a long conflict over the use of the Nile, which has ultimately affected demand and supply in upstream countries for the most part. For instance, as mentioned earlier, these upstream countries have had considerable development challenges since their reliance on the Nile for social, economic and environmental benefit has been limited despite these countries contributing virtually all of the total flow of the Nile.

As a result, water conflicts in the NRB can be attributed to two key issues. Firstly, upstream countries provide virtually all the total flow of the NRB. And secondly, downstream Egypt and Sudan, as regional hegemons over the basin, have historically claimed the entire flow for their use.

Up to this point, international agreements governing the Nile have heavily favoured downstream countries. Moreover, the unilateral development of hydropower projects has further worsened the already uneven distribution of the Nile. Notwithstanding upstream countries now being able to access the Nile and develop hydropower projects through China's financial support, this does not entail an equitable distribution of the Nile (GeeskaAfrica Online, 2015).

According to the environmental scarcity theory, the shortage of water from other water users has the potential to cause violent conflict (Homer-Dixon, 1999:48). Since China's growth in upstream countries' hydropower development is inevitable, this study argues that there needs to be an adequate balance between water demand management and a supply-oriented approach with the help of regimes in the region to avoid the emergence of disputes within the region (GeeskaAfrica Online, 2015). It can therefore be argued that given the lack of consensus and legitimacy of these agreements, a coordinated approach to the use and management of the Nile's water under the aegis of the AU and NBI is imperative.

However, both the AU and the NBI have played a limited role in the water diplomacy efforts between upstream and downstream countries. Both regimes have respectively failed to address demand and supply-induced scarcities, and to clarify the validity and/or invalidity of the Nile water agreements, which are the cause of an increased potential for conflict in the basin. This inability by the AU and the NBI is detrimental to peace and security in the NRB, because it has resulted in severe pressure from uncoordinated water use and management.

It is important to note that any institution, organisation or commission entrusted with the responsibility of ensuring the management and distribution of the Nile's water is, in one way or the other, required to address the salient features of environmental scarcity that challenge stability in the NRB. It therefore needs to take into account the

interdependence of these forms of scarcity. With the continued existence of these challenges in critical bodies entrusted with the responsibility of developing a cooperative solution in the region, the potential for conflict in the NRB remains (Othieno and Zondi, 2006:3).

To avoid conflict in the basin, the AU and the NBI have to clarify that the Nile is a shared resource and that what happens in one country, negative or positive, affects the others; hence the need for joint management and development for the benefit of all. Nonetheless, despite the AU and the NBI having shared watercourse agreements, they do not seem to know how to deal with environmental scarcity issues. According to Arnold (2013), this has led to many believing that one possible way to resolve the Nile dispute is to involve the ICJ, similar to the way in which the Okavango disputes were resolved.

CHAPTER 5: THE NIGER RIVER BASIN

5.1 Introduction

The RNB is and has been important to the cultural and socioeconomic development of the West African region (FAO, 2002:1). It is also an important lifeline for large parts of the Sahelian region (Wetlands International Africa, 2012). However, the basin, which is home to some of the poorest countries in the world, might be experiencing a new landscape of conflict with water resources being key players (Michel and Passarelli, 2014).

A combination of climate change, human population growth and unsustainable resource use is threatening the RNB (Jagow-Schultz, 2017). This is in addition to hydropower dams and extensive irrigation schemes, which all affect the flow of the RNB (Wetlands International Africa, 2012). The climatic and environmental situation in the RNB has affected the quality and quantity of the water in the basin thus raising concerns about sufficient supply to meet the growing demand, and equitable access (Abebe, 2009:123). Because the river is an important source of freshwater in this arid region, a coherent management agreement is needed between the riparian nations (Centre for Ecology and Hydrology, 2017).

As per chapters 3 and 4, this chapter will be divided into four sections. The similarity in the chapter's demarcation and application theories[28] respectively, is due to the the RNB possessing the same serious environmental and regime challenges detrimental to combustible hydropolitics over such shared water resources as in the OSRB and NRB. This is despite being located in an entirely different region and aligned to a totally different regime with different protocols.

[28] Homer-Dixon's environmental scarcity theory, and regime theory

5.2 Description of the Niger River Basin

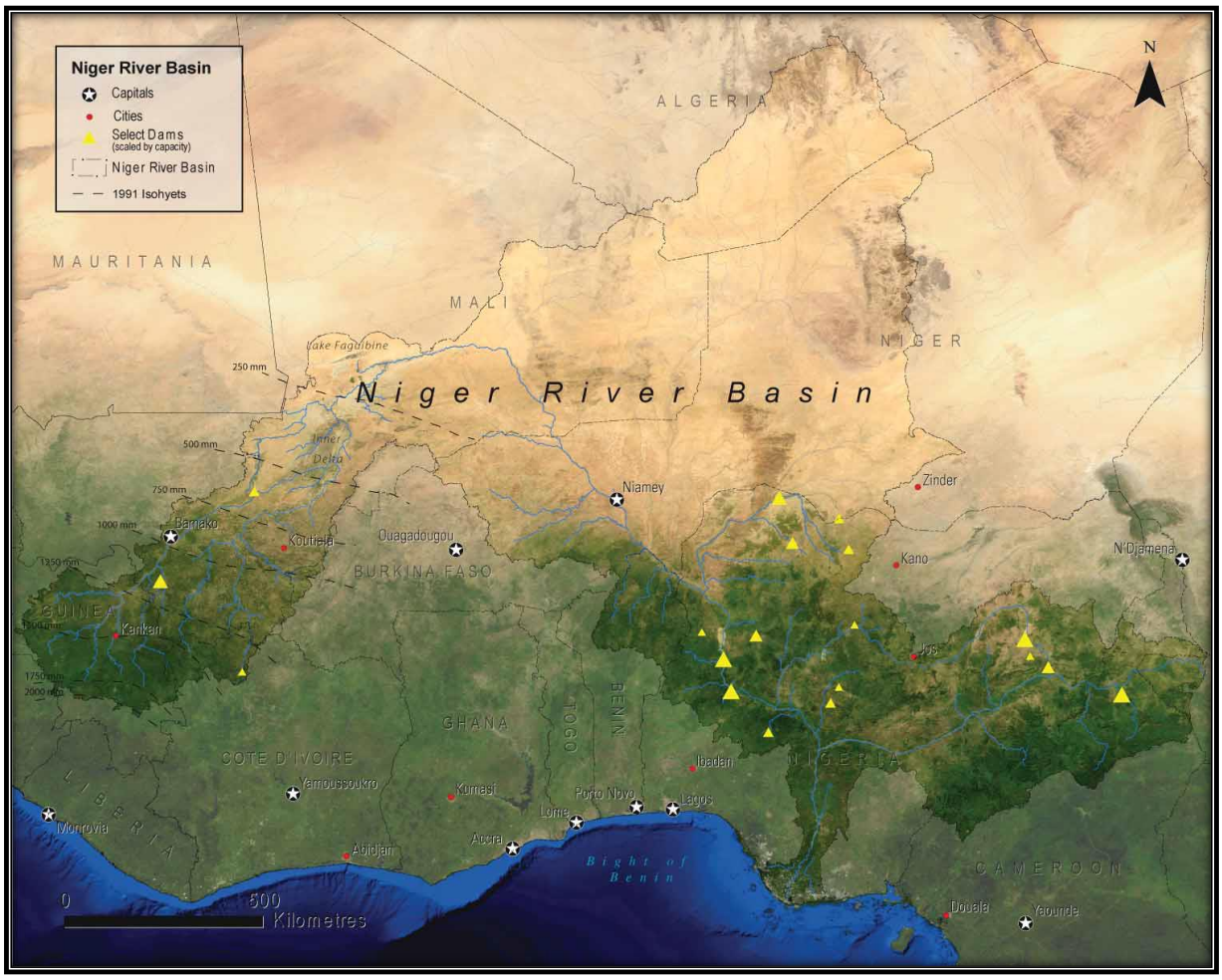
Located in Western Africa, the RNB starts in the highlands of Guinea, threading eastwards mainly through Mali, Niger and Nigeria before entering the Gulf of Guinea to the Atlantic Ocean (Abebe, 2009:122). As the river nears the Sahara, where it forms an inland delta, its hydrology changes and it loses its flow and volume. The reason for the change is that the inland delta is an area of high evaporation composed of a number of slow moving channels. Only after the Benue River does it become a large river once more (Centre for Ecology and Hydrology, 2017).

The Niger is the third longest river in Africa after the Nile and Congo, flowing for 4,200 km. The drainage basin covers a surface area of just over 2.2 million km², extending into 10 countries (see map 9). These countries are Guinea, Côte d'Ivoire, Mali, Burkina Faso, Algeria, Benin, Niger, Chad, Cameroon and Nigeria. The RNB has 76% of its area located in just three countries (Mali, Niger and Nigeria) (Aich *et al,* 2016:3).

According to Mahé *et al* (2009:7−8), from the stand point of water resources, the RNB can diagrammatically be divided into four zones. Zone 1 is the Upper Niger Basin, which is found in Mali, Guinea, and Côte d'Ivoire. Zone 2 is the Inland Delta, which is situated entirely in Mali. Zone 3 is the Middle Niger Basin, which lies within Mali, Niger and Benin. Zone 4 is the Lower Niger Basin, which lies between Cameroon, Nigeria and Chad (Mahé *et al,* 2009:7−8). The RNB's main tributary is the Benue River (Jagow-Schultz, 2017).

The RNB and its tributaries are an important water resource for multiple uses, including flood plain agriculture, irrigated agriculture, livestock wetland grazing and watering, production of hydropower, and domestic and industrial uses of water (Goulden and Few, 2011:45). The RNB and its tributaries, with a population growing at approximately 3% a year on average (Andersen *et al*, 2005:1), are a key source of water for the drier regions within the western Sahel zone and support the economy of the estimated 100 million people living in the basin (Goulden and Few, 2011:5).

Map 9: Map of the RNB (UNEP, 2010:60)



The use of the Niger by riparian countries and their dependency on its waters vary. For instance, because Mali, Niger and Nigeria encompass enormous percentages of land area in the basin, their dependence on the basin's water resources is relatively high. On a contrary, Burkina Faso, Chad and Côte d'Ivoire constitute a small land area and therefore rely less on the Niger for water. Nonetheless, all these riparian countries would benefit from a comprehensive management of basin (Abebe, 2009:122). The RNB is thus a key source of water, especially for the western regions of the Sahel (Goulden and Few, 2011:16). Since the RNB is shared by 10 countries, water resources management is coordinated at the international level by the NBA (Goulden and Few, 2011:21).

5.3 Homer-Dixon's environmental scarcity theory: an analysis of environmental scarcity in the Niger River Basin

According to Homer-Dixon's environmental scarcity theory, the scarcity of renewable resources such as water as a result of the existence and interaction of demand, supply and structural-induced scarcity, could lead to conflict (Homer-Dixon, 1999a:8).

This is also true for the RNB. It is therefore important to analyse the existence, degree and interaction of these forms of scarcity and their potential to lead to a nascent environmental conflict in the RNB.

Homer-Dixon's environmental scarcity theory posits that, environmental scarcity of land and water resources rapidly worsening in many parts of the developing world, coupled by weak institutional mechanisms, poses a conflict risk. This is because such worsening scarcity and weak institutions have an immediate direct and indirect impact on the well-being of societies and states.

It is because of this nascent environmental conflict that Homer-Dixon's environmental scarcity theory attempts to outline the relationship between conflict threats and environmental factors (Homer-Dixon, 1999a:53).

The RNB, because of its current resource depletion and governance crisis, is not immune to these conflict threats. Acknowledging that environmental scarcities have complex causes, Homer-Dixon's environmental scarcity theory's analysis of the Niger basin incorporates these causes. They include, the size of the population consuming the resource and consumption behaviour in the RNB; the depletion and degradation of resources; and the distribution of resources (Homer-Dixon, 1999a:8; 177).

5.3.1. Demand-induced scarcity: population growth affecting water resources in the Niger River Basin

Population growth and rising resource consumption affects resource availability (Homer-Dixon, 1999a:112). The RNB is inhabited by 120 million people across 11 countries (Blumstein, 2016), with a growth rate of approximately 3% per annum.

Homer-Dixon (1999a:52) argues that such an increase in population size and the increased per capita demand associated with it will undoubtedly increase the demand for land and water resources in the basin. It will simultaneously decrease supply by contributing to resource depletion and degradation (Homer-Dixon, 1999a:52).

The population of Nigeria is 190 million people (Worldometers, 2017a), with 18 million in Mali (Worldometers, 2017b) and just over 20 million in Niger (Worldometers, 2017c). According to Olomoda (2002:15), there is a rapid migration to urban areas as a result of climatic variability and change which have led to poor rainfall and desert encroachment, and subsequently causing scarcity.

The rate of urbanisation has been a rapid throughout most of West Africa since the 1950s. Several of the resulting urban agglomerations fall within the RNB, some of them located on the banks of the river, such as Niamey and Bamako. Access to improved water sources is an issue through most of the basin, and the projected population growth for the next few decades will increase the need (UNEP, 2010:61). However, the growth of large cities along the river's banks has not been accompanied by the development of wastewater collection and treatment plants, whether for domestic or industrial wastewater (Andersen *et al*, 2005:56).

The population increase in countries such as Niger, which gets about 90% of its water from the RNB, or countries like Nigeria and Mali that depend on the RNB for irrigation and farming, poses a serious demand and supply challenge. Steady increases in the populations of these areas are damaging the resources of the surrounding area (Ayuba, 2016). Not to mention that this area is one of the most impoverished in the world with all of the countries, except Cameroon, having more than 50% of their populations living below the poverty line. This makes it extremely difficult for development to occur in the region (World Hunger, 2015).

Mali and Niger depend on the RNB and its tributaries for the majority of their water resources. Niger, in particular, is highly dependent on river flows from upstream countries. At the same time, Nigeria contributes a large amount of flow to the river from rainfall within Nigeria (Goulden and Few, 2011:16). Michel and Passarelli (2014) predicts that in the next 15 years, the population across Mali, Niger and Nigeria will

grow by 75%, soaring to 337 million. Further, more than half of these people will be living in the cities (Michel and Passarelli, 2014).

The exploding urban population growth, mostly in developing regions, means that certain challenges related to water will occur, which will certainly affect the sustainability of human urban settlements. These include the lack of access to safe water and sanitation, and increasing water-related disasters such as floods and droughts. In cities, the provisions for water and sanitation have been the most pressing and painfully felt when lacking (UNDESA, 2015).

The RNB is at the centre of an important migration flow from north to south, due to economic differences and the demand for labour. The poorer and drier countries of Burkina Faso, Chad, Mali, and Niger export their labour to the coastal and wetter countries of Nigeria, Côte d'Ivoire, Benin and Cameroon, largely for the production of cash crops (including coffee, cocoa and bananas). To a lesser extent, there is also the migration of the Bozo and Somono fishermen to the large reservoirs on the RNB and of pastoralists, with their stock, to the Inland Delta in the dry season (Andersen *et al,* 2005:66).

Migration and large-scale demographic movements have, largely, developed in response to the river and the seasons, with herders moving their cattle and sedentary farmers relying on the bounty of the Inland Delta and flow-recession agriculture to raise their crops. With population growth that averages 3% in the RNB, pressure on existing resources has increased dramatically, in places leading to resource conflicts (Andersen *et al,* 2005:66). Moreover, rural populations throughout the region have traditionally responded to changing resource availability by migrating (Michel and Passarelli, 2014). Homer-Dixon's environmental scarcity theory indicated that environmental scarcity or changing weather patterns will produce environmental refugees. These are people who are forced to leave their home region due to sudden or long-term changes to their local environment, which compromise their well-being or secure livelihood.

However, Homer-Dixon's environmental scarcity theory's *ecological marginalisation* perspective does not regard migration as a result of environmental scarcity as a good

adaptive strategy. This is because high population densities in specific areas as a result of migration, combined with a lack of knowledge and capital to protect local resources, will cause severe environmental damage, chronic poverty and violent disputes (Homer-Dixon, 1999a:15).

The demand for water for various purposes and uses has prompted riparian countries to develop the basin. According to Wetlands International Africa (2012), the critical water flow of the Niger is under ever more stress from dam infrastructure for hydropower and extensive irrigation schemes. Dams in the Upper Niger, in Guinea Conakry and southern Mali withdraw large amounts of water destined for the Inner Niger Delta.

Today, fewer than 150 large dams of a total of 1,300 on the continent are in West Africa. The region has less than two large dams per 100,000 km², as compared to 4.3 dams per 100,000 km² in Africa as a whole. The RNB has 27 major dams and over 5,000 small dams. Many projects, especially multi-purpose ones, are being initiated.

In most cases, the projects are conceived only at the national level, even though the purpose of the dam is essentially regional and the construction of a structure has, by definition, consequences beyond its borders. These consequences include changes in the hydrologic regime of the river, the destruction of natural habitats and the agricultural production and ecosystem services that they provide for livelihoods and food security (Ayuba, 2016:14).

The absence of a shared vision and a sustainable development action plan (SDAP) in the basin produced uncoordinated developments, with related undesirable environmental and socioeconomic outcomes. Due to international concern and subsequent pressure, some of these projects had to stop (Olomoda, 2002:22). The development of new dams not only raised ecological concerns, but also provoked difficult negotiations over equitably sharing the resources (Diarra, 2011). This issue, together with a lack of shared visions, hampers development (Olomoda, 2002:22).

5.3.2. Supply-induced scarcity: degradation and depletion of water resources in the Niger River Basin

According to Homer-Dixon (1999a:48), because of a drop in the supply of water resources as a result of increased demand, it is assumed that the resource in question will shrink. Unfortunately, people's reliance on renewable resources has led to the depletion and degradation of these resources faster than they are being renewed.

During recent decades, civil war and unrest in several countries that border the RNB have made it the recipient of large numbers of people displaced by violent conflict, adding pressures and stresses to already fragile lands. For example, in 2003 more than 25,000 refugees settled in the Fouta Djallon and Mount Nimba regions of Guinea. This led to increased degradation of the highlands, with rapid deforestation and associated land degradation, soil erosion, gullying and loss of productive lands. The loss of absorption capacity causes rapid run-offs, with the consequences of high sedimentation, the siltation of existing infrastructure, floods and changes in river flows affecting the downstream (Andersen *et al*, 2005:66).

The RNB is currently facing water-related challenges at basin level (Goulden and Few, 2011:6). According to Beekman (2005:35), the Niger is considered to be one of the rivers most affected by freshwater shortages. This crisis has therefore led to competition among the Niger water users over already limited water resources.

The scarcity of water and its related competition in the RNB is producing tensions (Abebe, 2009:123). Water use is increasing, resulting from agriculture, domestic uses and hydropower (Beekman, 2005:36). The resulting over-use of water and land resources by farmers and the deforestation related to it, and the pollution emanating from industries and households has led to the degradation of the environment (Abebe, 2009:123).

Pollution caused by these factors is making the Niger's water increasingly unusable (Beekman, 2005:35; Simpkins, 2010). The degradation of water quality is a significant problem for the Niger (Andersen *et al*, 2005:56).

The depletion of the RNB as a result of unsustainable use also proves costly for riparian countries. For instance, both the UNEP and the UNDP calculated the annual losses of Mali. Both these agencies estimated that, as a result of water scarcity, water-related illnesses, pollution, waste, deforestation and desertification, Mali alone lost 20% of its GDP. Similarly, the World Bank made its calculation on the annual costs of Nigeria as a result of environmental degradation. According to the World Bank, Nigeria's annual cost is estimated at about 5 to 10% of its GDP (Michel and Passarelli, 2014).

For the most part, cities along the river have not developed collection and treatment plants for either industrial or domestic wastewater. In addition to urban pollution sources, agricultural run-off, particularly fertilizers, have been found at several sites.

At the coastal delta, oil production has been the source of a host of environmental issues. Millions of barrels of oil have been spilled in the delta's oil producing region (UNEP, 2010:62). According to Phil Vernon, International Alert's director of programs for Africa and peacebuilding issues,

> You've got vulnerable people, vulnerable households, vulnerable communities living within… fragile systems, governance systems, [and] environmental systems, (Diamond, 2011).

The scarcity of water in the RNB has led to conflict between farmers and herders (FAO, 2002:1). Furthermore, Michel and Passarelli (2014) asserts that these environmental pressures and resource scarcity in the Niger region have also played a part in producing widespread insecurity and militancy in the region. These have emerged as a result of a dearth of economic opportunities due to dwindling resources. They blame the 2013 radicalism of the Islamic terrorist group associated with Al Qaeda in Mali and the emergence of Boko Haram in neighbouring Nigeria on resource scarcity.

Firstly, they assert that in Mali, these radical Islamist factions were able to seize control of much of the nation's territory by exploiting a pre-existing revolt among the region's Tuareg peoples, first absorbing and then displacing the Tuareg insurgent forces. Crucially, this long-standing Tuareg rebellion first arose, in part, from the perceived indifference or inability of a distant central government to provide relief to Tuareg regions plagued by sustained drought in the 1970s and 1980s. Bamako eventually

dampened this initial rebellion with formal peace negotiations and promises of development, but assistance proved slow and the north remained marginalised. Tuareg grievances continued and the insurgency ultimately returned (Michel and Passarelli, 2014).

In neighbouring Nigeria, many observers, such as the International Crisis Group, link the rise of Boko Haram to the decline of the once-dominant agricultural sector in Nigeria's impoverished northern states and popular frustrations at government failures to deliver water, energy, roads and other services. With faltering agriculture and feeble infrastructure hobbling the northern economy, poverty and unemployment rendered the region's youth more vulnerable to Islamic radicalisation and Boko Haram recruitment.

Worse, the instability in Nigeria has now come full circle, threatening to deepen the cycle of insecurity as violence in the northern states further depress agricultural production, disrupt harvests and displace farmers fleeing the fighting (Michel and Passarelli, 2014). Although these tensions and conflicts are localised, the capacity of water scarcity to intensify these conflicts beyond borders should not be underestimated.

Major environmental degradation in the RNB results from either natural or anthropogenic causes. Natural causes relate to climatic variability and change, in particular the decrease in rainfall in the basin since the late 1970s. The major anthropogenic causes are land degradation, deforestation, and soil erosion that have taken place in the watershed, in large part because of increased demographic pressure (Andersen *et al,* 2005:67).

Homer-Dixon's environmental scarcity theory, in its analysis of the environmental depletion of damage, views land degradation, climate change, industrial and domestic issues, and migration as fundamental causes of the increase in the scarcity of land and water resources in the RNB (Homer-Dixon, 1999a:9).

According to Andersen *et al* (2005:67), four principal environmental issues − land degradation, water degradation, deforestation and biodiversity loss − have a

synergistic effect on water resources in the basin. Firstly, land degradation, in the form of erosion, is a result of inappropriate agricultural practices. These practices include bush fires, clearance for rice paddies, extensive cultivation, overgrazing and the reduction of wetlands from drainage.

Water degradation, mainly the deterioration of water quality, is a result of the non-point-source impacts of the pesticides and fertilisers used in agriculture, the point-source urban pollution, and the lack of sanitation infrastructure (sewerage) (Andersen *et al*, 2005:67).

Secondly, Jagow-Schultz (2017) sees habitat alterations as threatening to the wellbeing of the RNB ecosystem. He notes that these include dams, which affect the flow and sediment regimes of the river in addition to directly fragmenting and destroying aquatic habitats; irrigated floodplain agriculture, which displaces productive habitat; and the increasing discharge of sewage and other pollutants into the river.

Furthermore, in Nigeria petroleum development has contributed to several environmental problems, in particular those pertaining to water resources. In the Delta, these environmental problems are usually caused by accidental pollution and by illegal siphoning. In addition to petroleum development, the exploitation of coal, iron, gold and other mineral resources is an environmental threat to the basin (Andersen *et al*, 2005:57).

This pollution of water resources in the basin has also led to significant environmental conflicts in Nigeria's oil-rich Niger Delta. Ethnic rebel groups, such as the Movement for the Emancipation of the Niger Delta, have long cited the chronic pollution of their communities' land and water among the grievances motivating their attacks on petroleum operations and guerrilla warfare against the Nigerian state (Michel and Passarelli, 2014). Although ethnic cleavages may be the key to these conflicts, resource scarcity that results from degradation is a multiplier of already existing tensions.

Thirdly, at the moment the region relies mostly on its own agricultural sectors to feed its expanding populations. Half of all water withdrawals in Nigeria, two-thirds in Niger

and 98% in Mali go to agriculture. As a result of this dependence on the agricultural sector to feed the growing population, the water supplies are increasingly becoming stretched. The fact that drip irrigation schemes are not used in the basin, which will slash agricultural water demands while enhancing yields, exacerbates the situation. It is the lack of such irrigation systems that serve to exhaust water and land resources, thus exacerbating depletion, deforestation and desertification (Michel and Passarelli, 2014).

Biodiversity loss is caused by habitat destruction and a subsequent increase of invasive species, which are in turn caused by inappropriate fishing practices, deforestation and land conversion for agriculture (Andersen *et al,* 2005:67).

Fourthly, Andersen *et al* (2005:67) indicates that the deforestation that has occurred in the basin is the result of an increase in the need for energy and limited access to electricity. As a result, people in the basin use wood and charcoal for domestic purposes (which also contributes to land degradation).

Lastly, the main impact of environmental change on water resources in the Niger are related to changes in river flow, pollution and changes in water supply. Climate change and variability predictions suggest an aggravation of the situation from a decrease in rainfall (Beekman, 2005:39). Goulden and Few (2011:5) both assert that the RNB has experienced significant climate variability during the 20th century, making it suitable for studying the links between climate and conflict.

The effects of variations in climate are, and have long been, part of the reality of life in the RNB, mingling with other elements of the social and economic reality (Goulden and Few, 2011:47). Climate in the RNB is marked by a high degree of variability. Rainfall, river flows and temperatures already fluctuate a great deal and could become even more variable in the future (Diamond, 2011). Much of the basin is in a region of low rainfall, with high natural variability in rainfall and stream flows that affect land and water resources and people's livelihoods (Goulden and Few, 2011:5−6).

Climate variability is displayed in both seasonal variations in rainfall over the basin and year-to-year variability in rainfall. In some years, this variability manifests as extreme

events, which include droughts (recurrent in many parts of the basin) and severe floods. These have a major impact on lives, livelihoods, wellbeing and the productivity of sectors (Goulden and Few, 2011:45).

Communities were then forced to migrate as a result of drought and reduced water availability and access to water. This migration therefore increased pressure on available wetlands and arable land thus causing competition and conflict over these remaining resources in semi and arid zones (Abebe, 2009:123). And these conflicts, despite being resource-driven, have taken an ethnic dimension where indigenous groups have blamed their hardships on migrants and ultimately labelling them as *"outsiders"* (Abebe, 2009:123).

The RNB was seriously affected by repeated severe droughts, particularly over the periods 1968−73, 1982−5, and 1990−1, which caused great distress in the region (Amadou *et al*, 2014:3). The Sahel, the area just south of the Sahara, serves as the best example of the effects of severe droughts caused by climate change (Dong *et al*, 2011:4). The Sahel has experienced the worst effects of water scarcity, hotter temperatures and longer dry seasons (United Nations, 2007:18). For instance, In the 1970s and 1980s, the Sahelian droughts spanned the RNB causing famine, forcing dislocation of people and destroying livelihoods. A period of reduced rainfall across the Sahel began in the early 1970s and continued through to the 1990s, with two periods of very severe drought in the early 1970s and early 1980s (UNEP, 2010:62).

According to Jagow-Schultz (2017), the Niger dried up completely for several weeks in 1985 at Malanville in the Benin Republic. These developments may well be exacerbated by the lack of state and regional capacity to manage the effects of climate change (Wers and Conley, 2012:3).

Nigerian President Mohammadu Buhari said the basin is experiencing significant degradation of its resources under the combined effects of climate and human activities. The president noted that the phenomenon is,

> heavily compromising the future of the ever-increasing populations of the basin through the intensity and number of environmental, social and economic problems it is inducing.

Buhari who was represented by the Minister of Environment, Ms Amina Mohammed, said part of the processes for achieving a shared vision for the sustainable development of the basin led to the establishment of a SDAP for the basin (2008−2012). The newly adopted 2016−2024 operational plan, with its climate resilience investment plan, expected to gulp US$7.2 billion (National Mirror, 2016).

According to Michel and Passarelli (2014), climate change will inevitably make the environmental situation worse. They further assert that in addition to tripling water demands among the riparian countries in the past 30 years, long-term precipitation trends show a 30% reduction in rainfall since the 1970s, which has affected the RNB's flow. It has fallen by some 20 to 50%. These precipitation patterns are likely to grow even more variable, threatening both deeper droughts and stronger floods (Michel and Passarelli, 2014). With the lack of infrastructure such as irrigation systems to deliver reliable water supplies, this situation raises concerns for vulnerable populations across the region.

Climate change destabilises communities by adding uncertainty and stress, according to International Alert's Phil Vernon, and when a community is already vulnerable, the impact of that uncertainty and stress is amplified and the potential for conflict is greater. Moreover, that uncertainty has important implications for how people think about responding to climate change. As a result, in communities based in the Niger region, climate-induced vulnerability led to some kind of conflict (Diamond, 2011).

Degradation and depletion of water due to climate change will certainly reduce food production and availability thus increasing the vulnerability of communities, notably rural farmers, in arid and semiarid regions (Abebe, 2009:124). Research on the RNB finds that the effects of climate change in the region are pervasive and that *latent conflict* between groups (disagreements and disputes over damages to farmland and restricted access to water, but not physical violence) is common (Diamond, 2011).

Throughout the basin, river flows and rainfall have been decreasing since the 1970s, creating tension between two of the major communities living in the basin (farmers and pastoralists). Pastoralists are forced to travel farther to bring their herds to water, while farmers are expanding their cropland to feed growing populations, reducing the

pathways available to herders and their livestock (Diamond, 2011). Nonetheless, both herders and farmers suffer the effects of climate change. Climate change has driven herders and farmers further onto marginal lands (Michel and Passarelli, 2014).

The Inner Delta has seen a rise of conflicts due to drought conditions in the Sahel which have led to pressure on available land and water (Olomoda, 2002:15). It is clear that this, in combination with the less predictable precipitation attributed to climate change, will lead to diminishing water levels and water scarcity (Wetlands International Africa. 2012). The climatic future of the RNB remains uncertain, but climate change is expected to have a key influence on water resources and human security through its impact on climate variability and extremes (Goulden and Few, 2011:16).

Mali, Niger and Nigeria have all taken steps at the national level to implement planning for adaptation to climate change. Mali and Niger have produced national adaptation programmes of action (NAPAs), supported by the UNDP and the Global Environment Facility. This is a requirement for those classified as least developed countries that are signatories to the United Nations Framework Convention on Climate Change (UNFCCC) (Goulden and Few, 2011:22).

Mali's NAPA was completed in 2007 and led by the Ministry of Environment, supported by UNDP. Niger's NAPA was completed in 2006 and led by the National Environmental Council for Sustainable Development, with funding provided by Global Environmental Facility. Nigeria, since it is not classified as a least developed country, was not required to produce a NAPA. Nonetheless, with the support of the UNDP and CIDA, it began producing a similar document in 2010, which it called its national adaptation strategy and plan of action, and aimed to finalised it by the end of 2011 (Goulden and Few, 2011:22−3).

According to the London School of Economic and Political Science (2015), in 2011, these efforts resulted in the publication of the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria. The strategy outlines responses to climate change in key areas such as agriculture (crops and livestock), freshwater resources, coastal water resources and fisheries, forests, biodiversity, health and sanitation, human settlements and housing, energy, transportation and communications, industry

and commerce, disaster, migration and security, livelihoods, vulnerable groups, and education.

However, the policy document did not find official support. Instead, in 2012, the executive council approved the adoption of a National Climate Change Policy and Response Strategy. This strategy aimed to provide a framework for responding to climate change-induced challenges such as increased flooding and rising sea levels. There are also plans to create a National Strategic Climate Change Trust Fund and develop a national appropriate mitigation action document. In 2013, a National Policy on Climate Change was finally approved and adopted by the federal executive council. This forms the basis for any new climate change law (LSE, 2015).

5.3.3. Structural-induced scarcity: uneven distribution of water resources in the Niger River Basin

The more scarce and unevenly distribute water resources continue to become, the more contentious the water issue will be. More so in areas and regions where there is a high population growth (Abebe, 2009:124). The analysis of the RNB, as far as Homer-Dixon's environmental scarcity theory is concerned, is very important as structural-induced scarcity (uneven distribution of water resources) does not exist in its pure form.

The case of the RNB will enable this study to illustrate the theory's idea that the interaction of demand and supply-induced scarcity can produce structural-induced scarcity. And this will justify the notion stated by the theory that these three forms of scarcity are not mutually exclusive, and their interaction has the likelihood of instigating the occurrence of each other. Structural-induced scarcity in the Niger can occur as a result of resource capture, which will be influenced by the depletion of resources as a result of population growth and the unsustainable use of water resources.

Homer-Dixon's environmental scarcity theory indicates that when powerful groups within a society recognise that a key shared resource is becoming scarcer (due to both supply and demand pressures), they will use their power to manipulate the regimes governing resource access in their favour, thereby accumulating more resources at

the expense of other riparian countries (Homer-Dixon, 1999a:15). Homer-Dixon (1999a:74) further argues that greed and the fear of the disadvantage that rising scarcity might produce can be one motivation.

The existence of dams on the river, when combined with climate variability, has caused misunderstandings between countries sharing the river in the past (Goulden and Few, 2011:21). In West Africa, the leading cause of misunderstandings and tensions among riparian countries over water resources is the increasing number of large dam projects which have significantly reduced the availability of water resources of one riparian country by the other. Examples include:

- Senegal and Mauritania in June 2000 (IRIN news, 2000)
- Burkina Faso and Ghana in 1998, when the increase in water use by Burkina Faso reduced the amount of water going to the Akosombo hydroelectric power station (Gao, 2010)
- Benin and Niger, over the sovereignty of Lete Island, the meeting-place of nomad pastoralists from Niger who settle there seasonally, and sedentary farmers from Benin (IRIN news, 2015)
- Niger and Nigeria when Niger constructed dams that reduced the water flow to Nigeria, which has large dams for hydro agriculture and energy (Sahel Standard, 2015)
- Cameroon and Nigeria, where the *migration of Lake Chad* attracted Nigerian immigrants to the Cameroonian part of the lake (Abebe, 2009:124; Youssef, 2016).

According to Diarra (2011), the new dams not only raise ecological concerns, but also provoke difficult negotiations over equitable sharing. This is a result of the divergent interests of riparian countries. Moreover, ecologists fear that new dams will have damaging effects such as an uneven distribution downstream, particularly for the more than a million people who live in the Inner Niger Delta in Mali. For instance, large-scale irrigation projects and hydroelectric dams have caused the water level in the Niger's fertile and ecologically-diverse wetland to fall by more than 20 cm, shrinking the annually-flooded area by 900 km^2.

According to Blumstein (2016), the construction of dams affects water levels, which ultimately has an impact on people depending on fisheries, rice production or livestock. Furthermore, the decrease in water levels means that the navigation of the river would also be constrained, since the water would no longer be deep enough for large boats (Diarra, 2011).

Blumstein (2016) argues that existing competition over natural resources, and local conflicts, could therefore grow as a result of the environmental change caused by both natural and human activities. The reason being that environmental change may shift the balance of power between states, thus producing instabilities that could lead to war. Moreover, Blumstein (2016) argues that this could further destabilise a region which is already characterised by high political instability.

Diamond (2011) blames the worsening tensions in the basin on poor policy decisions. This also calls for environmental laws and regulations in the region to be modified to address these environmental problems in the basin (Beekman, 2005:38). Therefore, regime-based interstate cooperation is a reality that is in need of an explanation.

Given the existence of the three forms of scarcity in the RNB, and their argued potential to lead to a nascent environmental conflict, it is important to analyse the formation and capacity of regimes in the basin to address environmental scarcity and thus avoid nascent environmental conflicts in the basin.

5.4 Regime Theory: An analysis of regime formation and capacity in the Niger River Basin

It is essential that the RNB establishes a binding cooperative agreement to avoid conflict over its water resources since its catchment area covers several countries (Olomoda, 2002:13). A common approach to river basin development has been to develop *river basin master plans*. This makes sense because such a comprehensive approach facilitates the elaboration of a broad and holistic development plan and provides an overall blueprint for potential and planned water resources development in the basin (Andersen *et al*, 2005:59).

The nine RNB countries that form part of the basin's Inter-Governmental Organisation[29] are among the poorest countries in the world. Four of the nine basin countries are among the bottom 20 countries on the World Development Indicators scale, while on the UNDP's Human Development Index, seven countries are rated among the bottom 20, with Niger having the lowest Human Development Index rating in the world.

The need for development and investment in the region is evident, and the RNB holds tremendous potential; this is the reason for cooperation (Andersen *et al*, 2005:58). Furthermore, according to the World Bank (2015), today, the RNB is one of the most fragile developing regions of the world, by any measure.

When dealing with a shared river basin and in the absence of an effective basin organisation, most countries will plan unilaterally, as witnessed earlier in the chapter. In some river basins, member states have rushed to get facts on the ground through infrastructure projects, seeking to acquire rights ahead of any neighbouring states doing the same. The NRB is a case in point. In the absence of a cooperative agenda to which countries have committed and that clearly assigns benefits to each member state, the pursuit of unilateral development will most likely lead to lose-lose outcomes. The potential consequences of these unilateral actions would include increased tension and insecurity between member states, and lost opportunities for regional cooperation and integration.

For many years, the trend in each of the RNB countries has been toward a unilateral development of the river's resources. From the position of each nation state, this makes perfect sense, particularly given the lack of a strong regional river basin institution through which cooperative developments could be leveraged, promoted, and instituted (Andersen *et al*, 2005:63).

Beekman (2005:38) argued that the Niger basin has a poor legal framework at both the regional and national levels. It is also characterised by the inadequate implementation of available regulatory instruments such as supra-national institutions,

[29] While a small area of Algeria falls within the Niger Basin, it is not a member of the NBA since it is neither a significant contributor nor a major user of basin water (McKinney, 2012)

created by riparian countries and responsive to a country's ministry in charge of water resources (Beekman, 2005:38).

the 1963 Niamey Agreement (*Act de Niamey*) led to the establishment of basin-wide cooperation and highly emphasized on economic cooperation in the RNB. For the purpose of further studying and deloping the basin's resources, the NRC − or *Commission du Fleuve Niger*/CFN − was established the following year. This led to the creation of the NBA. Among a number of its mandates, the NBA aimed at developing the water resources of the basin. However, due to difficulties in carrying out its mandate, the NBA's convention was revised in 1968, 1978, 1979, 1980, and 1987 (Niasse, n.d).

5.4.1. Basin-wide context and multilateral regimes

5.4.1.1. The 1963 Niamey Agreement concerning the River Niger Basin Commission and the navigation and transport on the River Niger

The basin faces many environmental problems as evidenced above. However, the RNB has the potential for a spectrum of development uses including domestic and industrial water supply, flood control, hydropower generation, irrigation, fisheries, navigation and tourism (United Nations, 1984:209).

Just after independence in the early 60s, and inspired by the Tennessee Valley Authority (Waterwiki.net, 2009), the RNB riparian jointly developed a mandatory agreement to form the RNB Commission (NRC). The NRC was initially formed to foster collaboration over the management and use of the Niger and to promote sustainable development (Olomoda, 2002:13).

On October 26th 1963, The Niger riparian countries held a convention in Niamey to establish the NRC (see Annexure G). A year later, on 25 November 1964 after a series of negotiations, an *Agreement concerning the RNB Commission and the navigation and transport on the River Niger*, also referred to as the Niamey Treaty was adopted (United Nations, 1967:23).

Article 12 of the agreement relating to the agricultural and industrial use and development of the RNB clearly states its aims with regards to the development, use and sustainability of the RNB. According to article 12:

> They undertake further to abstain from carrying out on the portion of the River, its tributaries and sub-tributaries subject to their jurisdiction any works likely to pollute the waters, or any modification likely to affect biological characteristics of its fauna and flora, without adequate notice to, and prior consultation with, the Commission (United Nations, 1964:27).

This agreement led to the establishment of the NRC to manage and develop the RNB as set out in article 1 of the agreement. According to article 1:

> There shall be established an Inter-Governmental Organization … which shall be called River Niger Commission (United Nations, 1967:23).

However, the NRC's functionality was poor. As a result, three conventions, in 1968, 1973 and 1979 were established. At each convention, the following statements about the aims were raised. Firstly, the 1968 convention aimed at ensuring an enhanced development of the basin's resources through forging cooperation between member states. Secondly, the 1973 convention emphasised the freedom of navigation on the Niger among member states. Lastly, the 1979 convention aimed at enabling equal access to the basin (Olomoda, 2002:13).

5.4.1.2. The 1980 convention creating the Niger Basin Authority (with protocol relating to the Development Fund of the Niger Basin)

In 1979, the 1964 Niamey Agreement was revised. This led to the adoption of *The 1980 Convention creating the Niger Basin Authority (with protocol relating to the Development Fund of the Niger Basin)* (see Annexure H). This meant that the NRC had been replaced by the NBA (from a commission to an authority) in an attempt to provide an institutional and legal framework to attract prospective donors and regain the confidence of its member states (United Nations, 1984:209).

According to article 21 of the 1980 convention:

> This Convention revises the Niamey Agreement, signed in Niamey on the 25th of November 1964, revised in Niamey on the 2nd of February 1968 and

> on the 15th June 1973, and in Lagos on the 26th January 1979 (United Nations – Treaty Series, 1984:216).

Although it revised the Niamey Agreement, the 1980 convention committed itself to inheriting the Niamey Agreements' duties and obligations. For instance, article 1(3) of the 1980 convention states that:

> The Authority inherits all the assets and assumes all the obligations of the River Niger Commission (United Nations, 1984:209).

On the 25th October 1964 following the adoption of the Niamey convention and the creation of the NRC, the NRC convention was revised several times to advance its institutional capabilities. However, these revisions failed to produce any result, thereby prompting the formation of the NBA to replace the NRC (Olomoda, 2002:17). The NBA is still headquartered in Niamey, Niger.

The preamble of the 1980 convention states the reasons for the NRC being transformed into the NBA. According to the preamble, the convention saw the need to further promote the socioeconomic progress and development of member states. It also aimed to reaffirm the willingness for unity and solidarity in the organisation for the overall development of the RNB. The Summit of Heads of State and Government, which met on 26 January 1979 in Lagos, therefore decided to transform the NRC into the NBA (United Nations, 1984:209).

The institutional and legal framework to carry out its mandate went through four phases between 1980 and 2001. Phase I (1980−6) saw the establishment of the Executive Secretariat. The most important assignment of this phase was to ensure that the aims and objectives set out in the 1980 convention were achieved. This was possible through financial support from donors. However, problems such as institutional weakness and inadequate finance persisted. As a result, the NBA could not carry out its assignment (Ayibotele, 2008:1). Moreover, the NBA did not meet the goals and objectives of the member states. Therefore, this led to some member states changing their membership to an observer position while others simply took part in meetings with uncertainty (Olomoda, 2002:13).

Phase II (1987−93) was to adopt a revised 1980 convention to cure the policy shortcomings of the 1980 convention, restructure the authority and adopt a 5-year development plan. As such, this phase saw the reformation of the authority to focus on development and to strengthen it institutionally and financially. In addition, a revised convention was signed in 1987, which committed member states to acquaint themselves with development plans relating to aspects affecting the RNB.

Furthermore, member states were prohibited from carrying out any works on the section, tributaries and sub-tributaries of the river that were likely to pollute the basin. However, the NBA failed to address the problems experienced in the first phase due to the notable lack of funds that confronted this phase and the attendant challenge of performing its duties of compiling essential data for long-term policy development (Ayibotele, 2008:1)

In phase III (1994−7), the problems experienced in phases I and II became worse, leaving the authority without political and policy direction. This led to the Economic Commission for African States stepping in to assist. Finally, phase IV (1998−2001) saw a resurgence of the authority. Most importantly, in this phase the authority regained the confidence of its member states and its development partners (Ayibotele, 2008:1−4).

Cross-boundary projects in the RNB have been made possible through the creation of a joint development plan of the river by the NBA (Abebe, 2009:125). The Niger riparian countries had come to the realisation that all the NBA's goals were possible if well managed. These are imperative aspects of development, as indicated in article 3 of the *1980 Convention creating the Niger Basin Authority (with protocol relating to the Development Fund of the Niger Basin)*, which states,

> the aim of the Authority is to promote the cooperation among Member States and to ensure an integrated development of the Niger Basin in all fields, by developing its resources, particularly in the fields of energy, water resources, agriculture, animal husbandry, fishing and fisheries, forestry and forestry exploitation, transport, communications and industry, (United Nations, 1984:209).

One of the NBA's major initiatives was the adoption and implementation of an SDAP, which most significantly involved managing several hydroelectric and agricultural dams built along the river. So, if one riparian country wanted to build a dam, it would have to take the plans to the NBA for a decision. Representatives from each of the RNB countries formed part of the NBA, so each country had a chance to comment on water resource development plans (Goulden and Few, 2011:21).

In Abuja in February 2002, the RNB heads of state agreed to develop a management framework for the basin by preparing a shared vision process (Andersen *et al,* 2005:59). The shared vision process was completed in 2008 (Talbi, 2013). It laid out cooperative actions that defined needs and priorities and identified management, development and investment actions (Andersen *et al*, 2005:59).

The shared vision was an expression of the countries' commitment to promote a framework for enhancing cooperation and sharing benefits deriving from the RNB's resources. The shared vision process encompassed several objectives. The first objective was political; to formulate a statement on the sustainable development of the RNB to be adopted by the RNB heads of state. Such a statement would include commitments to, and goals for, cooperation that would lead to joint developments in the basin. The second objective was operational; to prepare the SDAP for the basin. The SDAP was seen as an appropriate instrument to realise the countries' commitment to addressing the challenges of the basin. It included an innovative planning and priority-setting approach to defining the development opportunities in which member countries could jointly participate. The shared vision's third objective was financial; to mobilise resources from both member countries and international donor partners to implement the SDAP (Andersen *et al,* 2005:59).

The shared vision process allowed for member states to endorse their commitment to adequately ensuring equitable access, sustainable development and public participation (Niasse, n.d.).

According to Talbi (2013), noticeable achievements as a result of the shared vision process include:

- a 20-year SDAP for the basin was approved in 2007 by the Council of Ministers of the NBA
- a 20-year investment programme for the basin and the Water Charter were approved in 2008 by the Heads of State and Government Summit
- the Water Charter was signed in 2009 and ratified in 2010. In addition, Annexures to the Water Charter were prepared, and the first was adopted and signed in 2012.

International donors and member states have been instrumental in the funding of the NBA. The NBA also takes part in joint developments with associations such as the World Wildlife Fund, Wetlands International and other foreign donor governments (Abebe, 2009:125). Nevertheless, President Buhari reiterated that the NBA faced the challenge of financial capacity as member states failed to fulfil their financial obligation (National Mirror, 2016). This was a challenging factor confronting the organisations' capacity to execute imperative tasks relating to the development and management of the basin. This was also a major reason that environmental issues persisted unabated.

The environmental challenge also persisted despite a provision in article 4 of the convention. Among other issues relating to water control and use, article 4 further committed the convention to regulating main waterway flows and drainage, controlling floods, preventing and controlling drought and desertification, and preventing soil erosion and sedimentation (United Nations, 1984:211).

That the challenges persisted is indicative of poor policy execution and implementation by member states. Furthermore, it signalled the lack of political will by member states and exposed the NBA's lack of capacity to hold member states (signatories) accountable for actions that are hazardous to the RNB and which were committed in their respective countries.

5.4.1.3. The 1987 revised Convention for the establishment of the Niger Basin Authority

On 27 October 1987, the revised convention for the reorganisation of the NBA was adopted with three objectives in mind. Firstly, it aimed at harmonising and coordinating

national development policies on basin-wide resources. Secondly, the NBA's objective was to articulate a policy and implement a unified plan to improve the Niger. The NBA's third objective was to design mutual structures and projects (see Annexure I) (Olomoda, 2002:17; International Environmental Agreements (IEA), 2016).

These objectives are all important because to effectively and cooperatively counter the threat posed by environmental issues in transboundary river basins, regime member countries' will have to harmonise national laws, implement integrated plans and establish common structures to effectively implement transboundary agreements. Institutions can range from independent national bodies that coordinate policies, to joint institutions that formally receive decision-making power from the respective national governments (Brels *et al,* 2008:13). Harmonisation is normally necessary as a means of avoiding some type of dispute as a result of water scarcity (Earle, 2005:56).

Despite these new objectives, several operational and management challenges were still prevalent in the organisation. These includes various political and socioeconomic challenges faced by member states, and inadequate political will to support mandates. Similarly, due to the fact that riparian countries' stake in the basin differs, with Nigeria having 30% and Chad 1%, the riparian countries have varying levels of importance in developing and managing the basin. However, in an attempt to find a balance with regards to the equitable and accommodative financial accountability of developing and managing the basin, a new sharing formula was proposed (Olomoda, 2002:17).

This formula was adopted in December 2000 following the 6th Summit of Heads of State and Governments of the NBA member countries. This new formula allow for an equitable share of dues. It further gives Mali, Niger, Nigeria, as the three greatest beneficiaries of the RNB's resources, an extensive increase in their shares while the other member states receive corresponding budgetary relief. The new sharing formula ranges from 30% for Nigeria to 1% for Chad, which reduces the financial burden on the poorer nations (Olomoda, 2002:20).

In addition to creating regimes in the RNB, Niasse (n.d.) argues that there are numerous bilateral agreements that were established. These include the 1990 Nigeria-Niger agreement on the management, sustainability and equal use of their common

water resources; the 1998 Niger-Mali agreement on the utilisation of the Niger; the Guinea-Mali hydroecological management project of the Upper Niger; and, the 2000 Nigeria-Cameroon Protocol Agreement aimed at coordinating the release of water from dams.

Given the dates when these agreements were reached, it is evident that they took place years after the creation of the NBA. They therefore emphasize the principle of respect of the NBA as a central authority as opposed to challenging it. This is apparent in the discussions of the Nigeria-Cameroon agreement where the NBA acted as a facilitator (Niasse, n.d.).

However, Olomoda (2002:22) maintains that despite several adoptions of agreements and the transformation of the NRC into the NBA, several major institutional problems still persist. These include:

- a lack of adequate knowledge of national policy, activities and orientation of water resources projects at national level
- a lack of clear defined objectives and suitable regional strategies based on a clear shared vision or master plan acceptable to riparian countries for the development of the basin
- a lack of community involvement in the projects, from grassroot project planning to the project execution
- a lack of cooperation and adequate consultation between institutions, intergovernmental organisations and donor agencies.
- a lack of legal and institutional mechanisms for benefit-sharing to prevent and manage water-related conflicts
- a weak institutional capacity and vision for planning and coordinating the implemented action
- an inadequate framework for defining institutional objectives and policies
- an insufficient mechanism for consultation among stockholders
- inadequate institutional and operational capacity to plan, design and execute projects
- the lack of cooperation between riparian member countries

Homer-Dixon (1999a:4) asserts that environmental scarcity will leave political institutions fragile due to them having less, if any, financial, material and human capital (Homer-Dixon, 1999a:4−5). Although the loss of water supplies physically manifest as local and regional problems, water scarcity alone cannot trigger war. The main issue that determines the emergence and/or deterrence of war is the governance of water. This governance failure and poor coping mechanisms can contribute to unrest and conflict (Abebe, 2009:124).

5.5 Findings and concluding remarks

The poor governance of water resources have exacerbated its scarcity and distribution. All aspects of state and society are dependent on water security. This poor governance of water resources can produce instabilities, especially over shared water resources and in countries where institutions are already fragile. Access to water can become a thorny issue between relevant users if access by one user affects access and/or use by another user (Abebe, 2009:121).

It is evident that the interaction of demand and supply-induced scarcity in the basin has resulted in ecological marginalisation and resource capture. Furthermore, the presence and interaction of the three forms of scarcity (demand, supply and structural-induced scarcity) in the basin led to decreased agricultural potential, regional economic decline, population displacement and the disruption of legitimised and authoritative institutions and social relations.

First, environmental change (the depletion and degradation of water resources through natural and human activities) has negatively reduced or constrained agricultural productivity by limiting irrigation capacity and regional productivity. Homer-Dixon (1999a:87) suggests that institutions are largely helpful in assisting countries and their agricultural systems to respond and/or adapt effectively to rising land and water scarcities. However, if these institutions fail, then the availability of water for usage will decrease and agricultural systems will remain inefficient.

Second, environmental scarcity might negatively affect the regional economy in the Niger, either directly or indirectly, through other social effects such as changes in

agricultural productivity. Consequently, deforestation can depress the economy's long-term productivity, which may have a large effect on a country's overall economic development (Homer-Dixon, 1999a:89). This could lead to a regional economic decline.

Third, Homer-Dixon (1999a:93) argues that environmental scarcity can also lead to massive population displacements and/or migrations to neighbouring regions perceived as potential areas of satisfaction.

Lastly, severe environmental scarcity can exacerbate divisions among groups sharing a particular resource. Scarcity increases the gap between winners and losers; that is, between groups that gain from scarcity and those that suffer from it. As a result, this gap encourages competition among groups for the control of resources critical for survival. These aggravated social relations can consecutively disrupt institutions (Homer-Dixon, 1999a:96).

Climate change, unsustainable water use and a booming population growth in Mali, Niger and Nigeria are driving a looming resource shortage, exacerbated by strained infrastructure and regime capacity, that risks pushing them past the breaking point (Michel and Passarelli, 2014). Due to the uncertainties created by climate change for vulnerable communities in the basin, development and adaptation policies must be flexible enough to cope with extreme variability, both in the wet and the dry conditions of the RNB.

Boosting resilience will be key to ensuring that vulnerable communities have the flexibility they need to respond to future crises. It is evident from this chapter that policymakers are left with an urgent crisis of climate change. A solution that is inherently time-intensive (building resilience in vulnerable communities down to the individual level) is important simply because individuals in the region experience and react to climate change differently.

Economic deprivation as a result of environmental degradation may have already taken its toll, contributing to destabilising much of the region and potentially leading to a nascent environmental conflict, which could threaten global security. These

countries are face with pressing challenges in the form of socioeconomic change, resource stress and violent extremism. The challenge facing the countries of the RNB is to find ways in which the river's development potential can be realised. It is undeniable that the economic status of the region, being home to some of the poorest countries in the world, affects the formation and effectiveness of environmental regimes.

According to Niasse (n.d.) it was only in 2000 when the NBA appeared to have gained the confidence of member states. The delay in achieving full confidence of its member states was due to the organisation's lack of promoting transboundary cooperation as a result of conflicting interests, lack of financial accountability, and the number and size of the basin.

The main problem facing the NBA, which regulates all basin activity, is that it lacks political support from the member countries. As a result of this lack of political support, there is a greater lack of technical and financial support. For example, only the Federal Republic of Nigeria and the Republic of Benin have paid all their contributions to the NBA. The NBA also shows institutional weakness, specifically in an inability to attract the support of donors or the involvement of member countries in projects.

Each of the environmental issues mentioned above are extremely detrimental to the peace and security of the RNB. The NBA can play an important role in increasing awareness on the transboundary impact of socioeconomic pressures on natural resources. In addition, the NBA can assist member countries to identify investment resources to protect the basin and its watershed. This would provide benefits, not only to the country where the protection is undertaken, but also to the downstream countries, which will benefit from the protection of the source through improved water quality, controlled run-off and reduced sedimentation (Andersen *et al*, 2005:67).

In some cases, the downstream benefits from watershed rehabilitation and protection investments upstream might be so significant that the downstream countries receiving the benefits will invest jointly in such activities. The subsidiarity principle will help the NBA to identify areas, as part of the SDAP, where the institution will have a comparative advantage over well-established national and local agencies that are also

charged with working on these matters. The key questions are whether action in this field is part of the core NBA mandate, and whether a transnational approach by the river basin organisation is the most appropriate way to tackle a particular issue (Andersen *et al*, 2005:67).

The lack of adequate solutions aimed at addressing environmental scarcity at the face of worsening environmental damage, are among the leading causes of the current poverty in region. The countries should seriously carry out policies relating to the common vision for unified development and management of projects. This would guarantee that riparian countries benefit from the shared resource and they are able to address socioeconomic development concerns of the basin (Olomoda, 2002:22).

CHAPTER 6: CONCLUDING REMARKS, FINDINGS AND RECOMMENDATIONS

6.1 Concluding remarks

Africa is faced with various water-related issues that pose serious challenges to the peace and security discourse on the continent. These challenges include:

- the provision of safe drinking water
- the provision of water for food security
- access to adequate sanitation
- cooperation in transboundary water basins (since water resources are transboundary in nature)
- developing sustainable hydropower to enhance energy security while simultaneously protecting the environment
- meeting growing water demands
- preventing land degradation and water pollution
- managing water under global climate change
- enhancing regime capacity to address water-related issues.

These challenges, as mentioned earlier in the study, pose as risk factors for a nascent environmental conflict between riparian states in the face of weak regimes. Moreover, these challenges are complimentary to those identified by the 2000 Hague Ministerial Declaration, and additional challenges adopted by the World Water Assessment Programme (WWAP). However, over and above, the study takes into account the importance of other challenges that are not highlighted above which have been identified as crucial water-related challenges by the Hague Ministerial Declaration and the WWAP. These includes: managing risks, improving the knowledge base, water for industry, and water for cities (UNESCO, 2009:1; Koukkannen, 2017:2-3).

This study conceptualised Homer-Dixon's environmental scarcity theory as a theory that argues for the potential of conflict in transboundary river basins as a result of environmental scarcity. Environmental scarcity is triggered by a combination of

population growth and excessive strain on dwindling renewable resources, exacerbated by unequal access to that resource (Schwartz *et al*, 2000:79).

Furthermore, the study conceptualised regime theory, particularly on transboundary basins, as treaties on international rivers that hold essential norms and encourage rule-based cooperation to politically resolve problems and conflict in the field of international river basin management (Lindemann, 2009:700−1).

It is certain that the OSRB is of major economic importance to South Africa and Lesotho, as it contributes to each country's GDP by 26% and 100% respectively (Naidoo, 2017). However, environmental issues, notably land degradation in Lesotho, puts the country's water resources and, subsequently, the OSRB as a whole under threat (Lesotho Times, 2017). This is a very important issue as Lesotho is where the river rises. There seems to be a lack of coordination and domestication of land and water policies in Lesotho.

Evidently, Lesotho places the entire region at risk by not adequately managing and sustaining environmental resources, or resolving issues as far as the harmonisation and coordination of riparian states' environmental policies are concerned. OSRB riparian states will face difficulty in coordinating their water policies as Lesotho itself has difficulties coordinating its policy planning related to its land and water resources. These difficulties minimise the potential of basin-wide policy coordination and integration. According to Water Affairs Minister Kimetso Mathaba,

> coordination and integration planning in Lesotho could be achieved by instigating the integrated catchment management approach.

However, Lesotho adopted the Water and Sanitation Policy of 2007, the Water Act of 2008 and the Long-Term Water and Sanitation Strategy in 2016, as indicated in chapter 3. These all present a positive outlook for Lesotho's water sector (Lesotho Times, 2017). Moreover, as a result of the Climate Resilient Water Resources Investment Strategy and Multipurpose Project Preparation, also highlighted in chapter 3, Lesotho and its population will benefit from this project since its population lives within the basin (Naidoo, 2017).

ORASECOM's agreement with the African Water Facility and the NEPAD-IPPF will assist it to develop an optimised water resources investment plan and select a priority transboundary project that will be prepared at the feasibility level. Having integrated climate resilience into the process makes it possible for ORASECOM to holistically address environmental scarcity challenges. The agreement further allows the basin enhanced water resource management, more investments and more multipurpose projects (Naidoo, 2017). This forms part of the water regimes that are essential for basin management, as argued by the regime theory (Lindemann, 2009:700−1).

This study argues that in contrast to the Nile and Niger river basins, the water resource developments in the OSRB will improve as a result of multifaceted initiatives taken, thus improving the livelihoods and engendering sustainable socioeconomic growth in the region. It is therefore evident that the Orange-Senqu region is highly developed when comparing it with the Nile and Niger, which lack strong regional river basin institutions and are faced with markedly high levels of environmental scarcity.

Although there are institutions and/or agreements that may perpetuate the uneven use and/or distribution of the OSRB, they do not structurally prohibit the use of the basin by other riparian sates as is the case with the NRB. However, environmental conflicts over water resources are not likely in the immediate future. Theoretically, although environmental scarcity in the form of demand, supply and structural-induced scarcities is widespread as posited by Homer-Dixon's environmental scarcity theory, regime theory was able to indicate regime formation in these basins that shows signs of effectiveness, to mediate the effects of environmental scarcity.

The case of the NRB validated the probability of environmental conflicts in the immediate future in that, given the reduced outputs due to population growth, degradation and depletion of the Nile, and the uneven distribution of the Nile, competition over the Nile increases the potential for an inter-riparian conflict in the NRB. The theoretical underpinnings of the study found that environmental scarcity and ineffective regime capacity can lead to environmental conflicts; hence, Homer-Dixon's environmental scarcity approach and regime theory are key to explaining the current state of the Nile's scarcity, institutional capacity and conflict.

Supporting the idea that, as a result of environmental scarcity, a nascent environmental conflict in the NRB is probable is Homer-Dixon (1999:139) who argues that for a possible conflict to arise in a shared river basin, the following aspects must hold in a narrow set of circumstances:

- First, the downstream country's national security or survival must depend heavily on the constant flow of river in its direction.
- Second, the attitude of upstream countries must be threatening to the flow of the river.
- Third, the relations between upstream countries and downstream countries must be that of unpleasantness.
- Fourth, the downstream country must be militarily stronger than the upstream countries.
- Finally, fearing that upstream countries may limit water flow or use water as leverage, the downstream country may use intimidation or direct force.

The NRB, among other shared river basins, provides the best example in which all these conditions hold true. Firstly, Egypt is heavily dependent on the water of the Nile; so much so that it has regarded the free flow of the river as a matter of national security (Hadebe, 2013). Secondly, Egypt perceives the construction of dams in Ethiopia, for instance, as a hindrance or threat to the flow of the Nile's water (Al-Labbad, 2013).

Thirdly, tensions exist between downstream Sudan and Egypt, and upstream Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania, Uganda, the DRC and the recently founded South Sudan, and battle lines have been drawn (Hadebe, 2013). According to Starrs (1991:8), Egypt and Ethiopia share a long history of verbal attacks against one another over the Nile.

Fourthly, Egypt holds absolute control over the running of the NRB and is militarily stronger than the other states, allowing it to dictate the terms and conditions of the basin's use. Egypt controls the region's most powerful military. Finally, fearing that its upstream neighbours will reduce its water supply by constructing dams, Egypt has warned that it is ready to use force to protect its access to the Nile (Simpkins, 2010).

These events in the NRB reveal the central role that the Nile's water plays in high-stakes geopolitical developments (Stoa, 2014:1353−4). The increase of China's involvement in the NRB further complicates the situation. China is a key external actor and a willing alternative financial donor for upstream countries, and has been vital in the power shift and in shaping the landscape of transboundary water governance and development along the Nile (Heinrich Böll Foundation, 2012).

China has become a major exporter of hydropower projects to the Nile region (Erdal, 2013). Chinese companies and banks are currently funding and undertaking numerous hydraulic projects in upstream countries such as Burundi, Ethiopia, Kenya, Tanzania, the DRC, Uganda, and in Sudan, making it the fastest growing player in the Nile developments (Bosshard, 2009:47).

The reason for China's involvement in the NRB is to assist upstream countries to develop the Nile, thus changing the Nile's hydropolitical landscape, which has been dominated by Egypt for much of the past century. Egypt controlled and constructed the hydropolitical regime to favour its interests and maintain its hegemonic position in the basin. This was mainly made possible by its material, bargaining and ideational power (Cascão, 2009:248). Hanke (2013:59−68) argues that Egypt's powerful and influential status, for instance its economic development, military might, political stability and access to external political and financial support vis-a-vis upstream countries, enabled it to influence and construct the Nile discourse.

One of Egypt's most common and successful means of influencing the Nile discourse was its power to prevent financial institutions, regionally and internationally, from funding upstream countries' hydropower infrastructures (Waterbury, 2002:80). Donors such as the World Bank, European Investment Bank and regional banks such as the African Development Bank have been openly reluctant to fund projects in upstream countries due to Egyptian influence, stating,

> all downstream countries, Egypt in particular, have to concede to it for any projects to be financed, (Green Prophet, 2010;Jacob, 2012:138; Mayton, 2012).

China has become an alternative source of funding to upstream countries' hydropower projects, which has subsequently changed the hydropolitical status quo of the Nile. However, the presence of China in the Nile dam industry has presented both positive and negative effects on the Nile and its surrounding environment. Positive effects include upstream countries being able to use the Nile and develop hydropower projects. Negative effects include the creation of more environmental and social uncertainties through the financial and technical support of these unilateral projects. Homer-Dixon's environmental scarcity theory was helpful in outlining these uncertainties of human and environmental security, and showing how these projects aggravated environmental scarcity.

In a 2005 BBC interview, the former United Nations Secretary-General, Boutros Boutros-Ghali, argued,

> the real problem is that we need an additional quantity of water and we will not have an additional quantity of water unless we find an agreement with the upstream countries which also need water and have not used the Nile water until now, (Thompson, 2005).

It is been clear from the study's findings that a major problem surrounding the NRB is the lack of a binding agreement that ensures that all 11 riparian countries share common benefits from the Nile River (Turton, 2000b:2).

According to Othieno and Zondi (2006:2−3):

> There has to be a resolution to the question of balance between who has the historic right to the Nile's water, and issues of sovereign water rights especially with regards to where the river ought to be controlled, whether that be upstream or downstream.
>
> There also has to be a resolution on the impact of improper environmental and social assessments in the construction of hydropower projects that ultimately lead to massive displacements while degrading and depleting the Nile.

Considering the long-anticipated or predicted conflicts in the NRB, binding agreements should be put in place. Agreements and/or institutional structures would be essential in this regard as they would forge a new international water agreement for the NRB.

This requires a more serious interventionist role by the AU and the NBI because, whether conflict emerges or not largely depends on regime capacity in the region. The AU may help analyse state policies to identify common interests.

The AU's future involvement in water diplomacy efforts in the region may centre on promoting regional cooperation and providing a forum for discussion. The AU can help facilitate exchange and cooperation among scientific and technological experts, and provide a forum for transparent discussions between the parties.

However, the AU has played a limited role in past water diplomacy efforts between Egypt and Ethiopia. In addition, the AU's failure to change the status quo in the basin and achieve an equitable use of the Nile further maintained Egypt's veto power. The NBI played an equally limited role as far as the NRB downstream-upstream conflict is concerned.

Firstly, the NBI arguably did little to address the fundamental schism over the options regarding rights and obligations that differ between upstream and downstream riparian countries. Secondly, relatively little appears to have been done about the problematic water use by certain Nile riparian countries. These included unsustainable practices such as the development of new settlements in the desert, the farming of relatively water-intensive crops and storing water in reservoirs with relatively high evaporation rates.

Thirdly, the process of negotiating the NBI and the CFA has arguably not been sufficiently inclusive. For the most part, only government officials from the Nile riparian countries and representatives from the World Bank, UNDP and/or CIDA have been in attendance at the negotiations. Very few additional stakeholders have been allowed to participate in the negotiations and opportunities for public involvement have not been substantial, all of which made the CFA ineffective.

Furthermore, the fact that a comprehensive cooperative framework over the management and use of the Nile is ineffective makes the occurrence of disputes and environmental stress on the Nile is inevitable. The AU and the NBI need to rectify the current Nile environmental issues by forging a cooperative framework to enable a

common position on the management and equitable exploitation of the Nile. Their role should take into consideration the Nile region's already complex political environment.

Other than financial assistance, the international community (the US, the UN and the AU) can play an important role in the negotiations, advocating for collaborative efforts for effective and sustainable water management by all parties in the NRB.

In the RNB, where water scarcity and flow variability are always cause for concern, the only option for the sustainability of the water resources, optimal use and good member relationships is to pursue the path of coordinated, cooperative water resources development. It is only the development of dams that perpetuate the uneven use and/or distribution of the RNB. Similar to the OSRB, and in contrast to the NRB, agreements and institutions established in the RNB weren't created to prohibit the use of the Niger River by other riparian countries. Moreover, they do not structurally deny other riparian countries access to the Niger River.

In the first three phases of the institutional and legal framework of the NBA it seemed that a challenge confronting the Niger basin was the establishment of an effective transboundary organisation over a 20 year period. Both political will and financial responsibility by member states were central to these challenges, and both these key issues can be summed up as lack of accountability.

Since 1998, participation and commitment in the NBA has increased robustly; the payment of membership dues has improved owing to the new formula adopted; the performance of the Secretariat has improved remarkably. This owes much to consistent network of communication between ministers and heads of states and the appointment of key players such as top managers and technical experts. Such an improvement increased donor support.

To conclude these three case studies, it is important to note that while environmental changes may play a role in setting the stage for conflict, the causal relationship is highly complex and the role of regimes and/or institutions are crucial in the emergence of conflict.

In accordance with regime theory, for regimes to be successful and viable in these three case studies, the three additional key requirements as outlined by Andersen *et al* (2005:59) (legitimacy, relevance and constituency) are crucial. Other important factors, such as capacity and financial viability, are often a result of a lack of these three prerequisites.

Firstly, the legitimacy of an institution is defined by its legal and juridical basis, but is also a function of how the institution is perceived by those whom it is intended to serve, its credibility among stakeholders, the level of competency of its staff, and the transparency of its governance. Secondly, the relevance of the institution is similarly significant. And lastly, it is the *shareholders* of the institution, the constituency, who will be the ultimate judge of whether the river basin organisation has achieved legitimacy and relevance. Unless the constituency sees the NBA as directly relevant to domestic development priorities, it is unlikely to place real value on the institution (Andersen *et al*, 2005:59).

Andersen *et al* (2005:59) further argue that a practical consequence will be that the annual budgets of the institution are left unpaid and it will become increasingly irrelevant to national priorities, initiating a downward spiral that will be exacerbated as the institution, to maintain itself, will seek resources from a variety of sources (including donors), involving activities that no longer respect the institution's mandate.

It is important to draw an analysis of the interaction and effects of demand, supply and structural-induced scarcity in the OSRB, NRB and the RNB respectively to determine environmental scarcity outcomes. One major reason to assess this interaction is because Homer-Dixon (1994:8−11) earlier asserted that the environmental scarcity theory stipulates that these types of scarcity (demand, supply and structural-induced scarcity) are not mutually exclusive. They often occur simultaneously and interact with one another, ultimately leading to conflict.

Furthermore, Schwartz *et al* (2000:80) indicated,

> uneven distribution never acts on its own, its impact is always a function of its interaction with resource demand and supply.

On the basis of Homer-Dixon's (1991:91) argument, the OSRB, NRB and the RNB are expected to face a number of effects as a result of the occurrence and/or interaction of demand, supply, and structural-induced scarcity. These include decreased agricultural potential, regional economic decline, population displacement, and the disruption of legitimised and authoritative institutions and social relations.

From the arguments raised in this study, the continuation of demand, supply and structural-induced scarcity in the OSRB, NRB and the RNB will definitely affect agricultural potential, which will subsequently reduce regional economic activity as a result of worsening deforestation, water scarcity and environmental degradation and depletion. Following a decline in economic activity, agricultural potential and low per capita access to water in specific areas will eventually lead to massive population displacements. This phenomenon of displacement will be further exacerbated by the construction of large dams and IBTs.

Moreover, these aspects will all contribute to the failure, weakening and/or collapse of authoritative institutions meant to help societies adapt to scarcity and minimise the potential of violence. This will lead to conflict between the riparian countries of the OSRB, NRB and RNB. It was therefore essential that an analysis of regimes governing the OSRB, NRB and the RNB was provided to determine their effectiveness and capacity to help states and societies adapt to the effects of environmental scarcity and thus avoid a nascent environmental conflict.

6.2 Findings

Several findings can be drawn. Firstly, the study was able to underline that the scarcity of vital resources, and the absence of institutional capacity, can contribute to environmental conflicts. The study was successful, through Homer-Dixon's environmental scarcity theory, in showing that water can be subject to environmental scarcity, thus leading to environmental conflicts. The scarcity of water and its contribution to the intensity of the competition over resources has therefore presented a new landscape of global conflict that requires close and careful analysis. It is in this argument that it becomes evident that water, just as any other economic resource, has

a potential to cause tensions and conflict among users. Three cases (the OSRB, the NRB and the Niger River) were essential in supporting these arguments.

Secondly, the challenges of population growth, water scarcity, environmental degradation and insecurities as a result of the uneven distribution of water resources exposed the likelihood of conflict in these respective cases. In addition to challenges of environmental scarcity, is the lack of adequate cooperative measures to consolidate water sustainability, management and use. The volatility and proximity of transboundary basins due to the high dependence of all riparian countries on water resources is also a salient feature of nascent environmental conflicts.

The study found that environmental scarcity can contribute to the outbreak of conflict in the absence of institutions. Poor or weak institutions are catalysts to the emergence of environmental conflicts in regions where environmental scarcity has reached a boiling point. This is because societies and states become highly vulnerable to the effects of environmental scarcity, with no means and/or proper assistance to adapt. As a result, the inability to adapt to the impact of environmental scarcity will enable issues such as migration and resource capture as a means of survival, which subsequently causes degradation, depletion, and an uneven distribution of resources, thus leading to conflict.

Thirdly, the study further found that institutional support structures are important factors for the sustainability, management and use of the Orange-Senqu, the Nile, and the Niger River basins. Institutions are important mechanisms in mediating state behaviour over a shared resource, thus avoiding conflict. This is a notion that has been supported by various researchers (Keohane and Nye, 1977; Krasner, 1983; Godana, 1985; Young, 1986; Keohane, 1989; Kukk and Deese, 1996; Homer-Dixon, 1999; Hasenclever *et al*, 2000; Okoth-Owiro, 2004; Raadgever *et al*, 2008; Lindemann, 2009; Neumayer, 2001).

Moreover, the study found that the role of external actors, particularly China, is significant to the sustainability, management and use of transboundary basins. As a result, these external actors can be integrated into existing theories (Homer-Dixon's

environmental scarcity theory and regime theory) as factors influencing the nature and politics of transboundary basins.

Transboundary and water-related issues such as the provision of safe drinking water, the provision of water for food production and safety, access to adequate sanitation, cooperation in transboundary water basins (since water resources are transboundary in nature), developing sustainable hydropower to enhance energy security while simultaneously protecting the environment, meeting growing water demands, preventing land degradation and water pollution, and managing water under global climate change can be adequately addressed by institutions.

Regime capacity in the OSRB and the RNB is promising since there is a level of cooperation among riparian states and an acceptance of regime authority. This makes the development potential of these basins real and the avoidance of a nascent conflict in these basins possible. The positive outlook is a result of participation by riparian states in institutions created to govern transboundary basins. In contrast to the NBI, ORASECOM and the NBA have achieved a sense of full participation and membership of riparian countries, thus giving these regimes a legitimate, constituent and legal position to be operational over these basins. This means that the environmental challenges faced by these basins have the potential of being adequately addressed in the near future.

Although the ORASECOM and the NBA continues to face markedly high levels of environmental scarcity challenges threatening their capacity and stability, their regime capacity will remain resilient against the effects. The study draws support for this idea from the *institutional resiliency argument.* According to Solomon (2014:89), the establishment of cooperative water regimes is key to ensuring the resilience of regimes. This is also made possible, as argued earlier, by full riparian membership and participation. The following final section will outline the recommendations for moving forward developed from the findings, the analysis and the explanation of the environment-conflict linkages.

6.3 Recommendations

Research on the relationship between environmental scarcity and conflict promises to be a significant future research area. Moreover, it is likely to promote further dialog with political, social, economic, natural and security study scientists and academics as well as policymakers. The study aims to contribute to the environment-conflict literature by arguing that the politics over water that pose the threat of leading to environmental conflicts are a result of both environmental scarcity and institutional capacity. The study is of the view that this idea introduces new thinking into the environment-conflict literature. The research study was conducted in an attempt to address the research gap that exists between environmental scarcity and the emergence of nascent environmental conflicts.

For the most part, this research gap is a result of theoretical limitations that, in turn, have affected findings on the environment-conflict linkages. For any research to bridge the gap that exists in the environment-conflict research, it must be able to understand and explain *why* environmental scarcity, particularly in transboundary basins, is a risk factor for a nascent environmental conflict; *how* to analyse the possibility that environmental scarcity will lead to conflict; *where* environmental scarcity is more prone to lead to conflict; and, *what* can be done to alleviate potential environmental conflict as a result of environmental scarcity.

Firstly, environmental scarcity is the reduction of the quality and quantity of resources. Conflict becomes likely if this reduction is a result of the interaction between rapid population growth, degradation and depletion, and uneven distribution of resources. Moreover, this reduction in resource quality and quantity forces states and/or societies to face ecological marginalisation and/or pursue resource capture. The emergence of ecological marginalisation and/or resource capture is a risk factor for nascent environmental conflicts in transboundary basins.

Most researchers have ignored the inseparable link between population growth, degradation and depletion of resources, and distribution of resources in producing conflict. As evidenced in chapter 2, an analysis of the relationship between

environmental scarcity and conflict should not be limited to one of these three sources of scarcity, but should be made in consideration of all these sources.

Secondly, environmental conflicts are more likely to occur in regions with fragile institutions that have a poor capacity to address environmental scarcity. And lastly, regimes are possible mechanisms that can lessen and/or avoid the emergence of environmental scarcity, thus avoiding conflict. They can do this by addressing water-related challenges, setting parameters for water use, management and distribution, and can foster cooperation in transboundary basins by creating protocols and agreements.

Research on the link between environmental scarcity and conflict has often ignored regimes as key factors in determining the occurrence of conflict. As also illustrated in chapter 2, on the one hand environmental scarcity has an impact on the functionality and effectiveness of regimes, ultimately leading to conflict. Similarly, on the other hand regimes have the ability to mitigate the effects of environmental scarcity, thus avoiding conflict.

To avoid conflict over resources, heavy reliance is placed on the assistance that regimes provide to states and societies in adapting to the effects of environmental scarcity. More importantly, regimes are crucial tools to manage, sustain and use resources.

The study proposes the following research recommendations in moving towards addressing the aforementioned research limitations. Hydropolitics should not be viewed only as the *change in the hydrologic system*, but in conjunction with *institutional capacity to absorb this change*. As argued by Elhance (2000:202) in chapter 1, hydropolitics (the politics of water) is a function of two variables: the rate of environmental scarcity (the change in the hydrologic system); and the institutional capacity (regimes) to absorb that change. As a result, these distinctive but interrelated issues require distinctive and interrelated theories that are able to argue distinctively on these two variables, while simultaneously complementing each other.

The following main research questions were asked: Firstly, Is there a nascent environmental conflict in the Orange-Senqu, the Nile and the Niger River basins respectively as a result of environmental scarcity? Secondly, can regimes establish collective related behaviour and outcomes among riparian countries in these respective transboundary basins to correspondingly address environmental scarcity and avoid environmental conflicts?

Given the main research questions, it would be inadequate for one theoretical perspective alone to explain and address related issues and concerns, since these questions first require the study to analyse and explain environmental scarcity and its impact on riparian states in respective case studies. Secondly, these questions require the study to further analyse and explain regime capacity in respective case studies.

As such, the study used both Homer-Dixon's environmental scarcity theory and regime theory. It is only through such approaches and theories that the impact of environmental scarcity on states, societies and institutions, and their vulnerability to environmental scarcity and its potential for environmental conflicts can be analysed and understood. This research strategy, in the environment-conflict literature, has never been done before. It is the first time hydropolitics is discussed through Homer-Dixon's environmental scarcity theory and regime theory.

Environmental scarcity is best explained through Homer-Dixon's environmental scarcity theory. As previously argued by the study, the environmental scarcity theory illustrates how the scarcity of renewable resources can contribute to social breakdown and violence (Homer-Dixon, 1999a:4).

Homer-Dixon's environmental scarcity theory does this by providing environment-conflict linkages. And since environmental scarcities usually have complex causes, the theory assumes that environmental scarcity should be viewed and analysed in all aspects and complexities. The assumption behind Homer-Dixon's environmental scarcity approach is,

> resource scarcity, through the three causal forms of scarcity (i.e. demand-induced, supply-induced, and structural-induced scarcity), have the potential to cause conflict (Homer-Dixon, 1999a:8; 177).

The theory allows these three causal forms of scarcity to be incorporated into one analysis to avoid limiting environmental scarcity to one cause. This helps to broaden the view that environmental scarcity not only has an impact on societies, but also on states and institutions. Furthermore, the capacity of institutions can alleviate the vulnerability of societies, states and the institution to the effects of environmental scarcity.

However, Homer-Dixon's environmental scarcity theory has limitations that relate to extensively analysing and explaining the role that regimes play in the environment-conflict debate. This is despite the fact that the theory acknowledges the importance of regimes in the environment-conflict linkages. This is evident in its argument on ideational factors and on the structural-induced perspective (treaties, institutions and/or regimes that perpetuate uneven distribution). Since Homer-Dixon's environmental scarcity theory faces a potential flaw of not being able to theoretically argue on the capacity and effectiveness of institutions to alleviate the environmental scarcity impact, the study therefore saw the need to also use regime theory.

Regime theory is essential to outlining how institutions, particularly water regimes, can address transboundary challenges, thus fostering transboundary cooperation between riparian states. Furthermore, regime theory, although not being able to theoretically argue on the causes and processes of environmental scarcity, acknowledges that environmental scarcity is detrimental to transboundary cooperation if not well managed. Therefore, as Neumayer (2001:122) argued, regime theory is able to address the question of how cooperation can be achieved and sustained.

On a theoretical level, both Homer-Dixon's environmental scarcity theory and regime theory need to factor in, and account for, the role of external actors such as China, the US, the AU, Canada, etc. in their analysis of transboundary issues. This is because these external actors are important to the occurrence and/or mediation of environmental conflicts since they affect the geopolitical landscape of respective basins.

For instance, on the one hand, Homer-Dixon's environmental scarcity theory only focuses on an intra basin perspective (states and societies sharing transboundary

resources), while on the other hand, regime theory looks at inter-state relations within transboundary basins and makes no mention of the impact of external actors on transboundary management, use and sustainability.

Given the importance of external actors in transboundary geopolitics, the study proposes that both theories should include external actors in conjunction with environmental scarcity and regime capacity in their analysis of environment-conflict linkages. This will enable them to enhance their analysis and explanation of the relationship between environmental scarcity, regimes and conflict. Furthermore, this will be essential for the development and contribution towards the environment-conflict research. As a result, it will further empirical findings.

It is evident that understanding and analysing the relationship between environmental scarcity, conflict and regimes is broad and involves complex issues. However, these complexities cannot be ignored and it therefore becomes imperative to take into consideration each unique and complex social, economic, political, cultural and structural context (Tanzler *et al*, 2002:60).

As a result, the study proposes a *new* assumption to both theoretical frameworks. This new assumption is intended to develop and integrate both theoretical frameworks. The reasons are two-fold; Firstly, it is evident through empirical findings that external actors can and may perpetuate and exacerbate environmental scarcity, thus leading to conflict. Secondly, the study has also made it evident that external actors can take the form of regimes that influence state behaviour by setting implicit or explicit decision-making procedures around actors' expectations in a given area of IR. These assumptions are intended to consider the social, economic, political, cultural and structural issues.

The following assumption is proposed:

> Conflict over transboundary resources is likely to occur as a result of both environmental scarcity (demand, supply and structural-induced scarcities) and the existence of external actors. Moreover, conflict over transboundary

> resources can be prevented given the establishment of norms, rules, and the role of external actors that help regularise state behaviour and control its effects.

Theoretically, the study proposes that research into environment-conflict research, particularly hydropolitics, should be analysed and explained through the use of both Homer-Dixon's environmental scarcity theory and regime theory.

Extending on other solutions provided in this section of the study, the study further proposes the following solutions for the short, medium and long term moving towards de-escalating tension or conflict in the OSRB, NRB, RNB in particular, and transboundary river basins in general. International best practices to finding a solutions for short, medium and long term to de-escalate tensions and/or disputes include both diplomatic and/or legal mechanisms which have been used to settle disputes, including in the water area.

Firstly, improving the knowledge base about the negative impacts and positive benefits that water can bring will help in valuing water and thus managing potential risks. Tis knowledge includes preserving water quality and quantity for domestic, industrial and agricultural use, less over consumption and/or pumping, more sustainable hydropower, and the restoration of wetlands to enhance benefits (Mostert, 2003:9).

Secondly, an important solution to inter-riparian disputes important is the making of inclusive agreements. These agreements can either be implicit or explicit, written or unwritten, and legally binding or not (Moster, 2003:9). Thirdly, Agreements and their successes are dependent on "*institutions*" established. Given that institutions are referred to as "*rules of the game"* that define conduct and practice, riparian states must establish such rules. These rules may vary from operational rules, decision-making rules to constitutional rules which must define conduct and practice of regime member states in respective areas (Mostert, 2003:14).

This will also be imperative in guiding the interaction of member states amongst one another. Firstly, operational rules help in determining how much of water should be allocated on the one hand, and the adverse impact and/or benefits of the construction of infrastructures. Secondly, decision-making rules help in determining operational

rules. And this in particular enables the involvement of and participation of actors. And lastly, constitutional rules help to bestow and legitimises the power of decision-making by national governments. These rules enable the participation of member states in decision-making processes. Moreover, these rules enable for the conclusion of treaties and agreements (Mostert, 2003:14).

Fourthly, riparian states need to identify water-related issues as a "*collective problem"*. This will help in paving the way for an inclusive agreement to be reached, and will therefore enhance the potential for future collective gains and cooperation. It is much easier to achieve cooperation in situations where member states are able to realise that working collectively makes for a win-win situation to be possible.

Fifth, Mostert (2003:13) indicates that "*issue-linkage"* can also serve as an important strategy for achieving solutions to a problem. This means that an actor can make a solution of an issue that is of concern to another actor dependent on the solution of an issue that is important to oneself.

Sixth, member states must ensure the establishment of intergovernmental commission following the conclusion of framework agreements. These commissions are the sole responsibility of member states and as a result they must be effectively and efficiently financed and manpowered. This will enable these commissions to adequately address the management, sustainability and utilisation of water-related issues. Furthermore, such commissions offer good platforms for national governments, lower level governments, water users, local populations, and NGOs to meet and discuss issues. Sharing data and information is crucial in collectively identifying, prioritising and addressing issues.

And lastly, another long-term solution to de-escalating tensions and fostering cooperation is through participatory water management. This simply means the involvement of the public in management issues. For instance, individual farmers are mostly ignored, however, this can be redressed by including lower levels of government in management issues. These levels of government are much closer to individual farmers, water users and NGOs at local levels. Subsequently, their participation at these levels will eventually be scaled up to higher levels of government, and thus ultimately reaching respective intergovernmental commissions.

Article 33 of the UN Charter contains an extensive but not exhaustive list of dispute settlement techniques available to states. These include negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement, and resort to regional agencies or arrangements (UN, 2003: art.33: 8). However, states have the liberty to decide which of these mechanisms is best to employ. And their choices depends on a number of factors such as the nature of the dispute, the existence of lack of agreements, and the history and character of their relations (Vinogradov *et al*, 2003:27). Furthermore Vinogradov *et al* (2003:27) assert that in water controversies states can go through a number of dispute settlements mechanism and they use the Danube river case to substantiate their claim of where it had to go through numerous mechanism in escalating order before it could reach a solution.

It is expected that where a water dispute arises, the watercourse states should resolve it in such a way as to achieve an equitable result (UN Watercourses Convention, 2017). And this can be done firstly through reconciling opposing views and conflicting interests in order to find some middle ground. And ultimately the final outcome of this process should be a mutually acceptable and long-term solution that will form the basis of future cooperation (Vlachos, 2013:28).

Vinogradov *et al* (2003:27) suggested three phases that are imperative to identify in any water conflict. And these include: Conflict creation which focuses on diagnosis, anticipation, and prevention, including problem architecture and fact-finding; Conflict management which focuses on the development of confidence and trust between parties to a dispute; and, conflict resolution which allows for consensus building and depolarizing of conflicting interests.

- *Diplomatic*

1. Negotiation

Negotiations are considered merely as the first step that states usually take in resolving their dispute. Negotiation is the means of dispute resolution most often employed by states when trying to resolve any international conflict, including those over transboundary water resources (Malanczuk, 1997:275). Depending on the issues at stake and the number of states involved, negotiation can take different forms, from bilateral talks and diplomatic correspondence to an international conference. It can be

used at all stages of the conflict. Diplomatic negotiations are sometimes preceded by the meetings of experts (Vinogradov *et al*, 2003:27). Such negotiation processes should include a variety of actors such as affected states and individuals at grassroot levels such as farmers, parliaments, public opinion and the media. This will help in reflecting transparency and goodwill and/or faith of these negotiation processes.

Formal negotiations may sometimes be preceded by consultations, which usually involve the exchange of views and information. Consultation is normally an ad hoc procedure, but it also can be provided for in the watercourse agreement, either within an institutional mechanism or as a bilateral dispute prevention and resolution tool. The Nile River Basin Initiative can be considered as an ongoing multilateral consultation. Its components include the outputs of the series of meetings, the work of the panel of experts entrusted with advising on the elaboration of the Nile river basin cooperative framework, and a series of conferences held in each of the ten basin countries (Vinogradov *et al*, 2003:28).

2. Good offices and Mediation

A third party offering good offices to the conflicting states acts a '*go-between'* in order to persuade them to enter into negotiations. Neutral states, joint bodies, and international organizations, as well as individuals, can offer good offices (Malanczuk, 1997:275-6). Once the negotiations have started, the functions of good offices are usually deemed to be completed. For instance, the World Bank initially offered its good offices to India and Pakistan in their conflict over the Indus river waters (Vinogradov *et al*, 2003:28).

Mediation, as compared with good offices, is a step towards more active third-party participation in the negotiations. A mediator provides assistance to the disputing parties in finding a solution (Oklahoma Bar Association, 2015). For instance, in the Danube river dispute between Hungary and Slovakia, the Commission of the European Communities offered to mediate when the parties failed to resolve their disagreements on the future of the project through bilateral negotiations (Vinogradov *et al*, 2003:28).

However, the boundaries between good offices, mediation, and conciliation are sometimes blurred, and one procedure can often lead to another. The World Bank's

role in the Indus river dispute is a good example of such escalating involvement. In that case the World Bank's participation increased to the point that it was actively involved in finding a solution by providing significant financial assistance to the parties on condition of their consent to the terms of settlement. The World Bank drafted and brokered the final agreement, which was signed by the heads of the two states and by the President of the World Bank with respect to certain provisions of consequence for the Bank. As has been reported, in December 2002, for the first time since the conclusion of the Indus Waters Treaty, Pakistan formally contacted the World Bank, seeking its help as a guarantor and broker of the treaty. The Bank was asked to intervene and assist in finding a solution to the ongoing dispute with India regarding the construction of the Baghliar Hydropower Project (Vinogradov *et al*, 2003:29).

3. Inquiry and Fact-finding

Since disputes arise from disagreements on questions of fact, inquiry and fact-finding are procedures specifically designed to produce an impartial finding of disputed facts (Malanczuk, 1997:277). Fact-finding, or inquiry, allows states to refer questions to panel of experts for impartial third-party investigation of factual or technical matters before diplomatic negotiations. Under the 1907 Hague Convention for the Pacific Settlement of International Disputes, a commission of inquiry can be established "*to facilitate a solution by means of impartial and conscientious investigation*". But its role is limited to providing "*a statement of facts*" (Vinogradov *et al*, 2003:29).

4. Conciliation

In conciliation, an impartial third party is requested by the conflicting states to help them resolve the dispute by examining the facts and suggesting the terms of a settlement likely to be acceptable to them. Thus conciliation may combine elements of mediation and inquiry (Malanczuk, 1997:278-9). However conciliation is a more formal procedure, usually performed by a commission of the representatives of the parties to the dispute as well as independent nationals of other states. A sole conciliator may also carry out conciliation. The conciliator seeks to establish objectively the facts and applicable law in a dispute through independent investigation, which is followed by reporting of findings and recommendations to the parties, who

may accept the recommendations or chose another form of dispute settlement (Vinogradov *et al*, 2003:29).

5. Institutional Mechanisms

Transboundary water controversies and disputes are often resolved under the auspices of various international organizations and bodies, such as river basin commissions established by multilateral or bilateral agreements. A number of such mechanisms have been created for individual river basins or watercourses (Vinogradov *et al*, 2003:31). For instance, the ORASECOM, the NBI, and the NBA.

- Legal

1. Arbitration

In arbitration, all the crucial issues of substance and process are left to the discretion of the parties, thus making it more flexible. It requires the prior consent of each party to the dispute (Oklahoma Bar Association, 2015). Having agreed to submit their dispute to arbitration, the parties to the process have a considerable degree of choice concerning the seat and the composition of the arbitral panel, the procedure to be followed, the questions to be addressed by the tribunal, and so forth. Generally, each party appoints their respective arbitrator, and these two then select a third (agreed to by the parties) for the panel (sometimes called "*an umpire*"). The arbitral decisions are taken by majority vote, unless the parties have agreed to refer their dispute to a sole arbitrator. The decision, which can be kept confidential, is binding on the parties who, however, can agree on an appeal procedure prior to arbitration. Arbitration has been invoked on a number of occasions to resolve water controversies (Vinogradov *et al*, 2003:31-2).

1.1. The Permanent Court of Arbitration

The PCA is not a "*court*" per se, but rather a special mechanism, the primary purpose of which is to assist states in settling their international controversies. Along with

setting up arbitral tribunals it also offers services for fact-finding and inquiry commissions, good offices, mediation, and conciliation. The PCA adopted new rules for disputes relating to natural resources or the environment in 2001. The 2001 Optional Rules for Environmental Disputes are non-mandatory and designed to facilitate arbitration pertaining to disputes that involve public international law and the utilization of natural resources and environmental protection. The 2001 Optional Rules for Environmental Disputes are sufficient to address controversies over resource utilization and transboundary damages (Vinogradov *et al*, 2003:32-3).

2. Adjudication

The last option available to the parties to a watercourse dispute is to submit it to a standing judicial body: an international court (i.e. the International Court of Justice (ICJ) in The Hague, special courts such as the Law of the Sea Tribunal in Hamburg, as well as regional courts, like the European Court of Justice or the SADC Tribunal). This method differs from other means of dispute settlement in that neither the composition of the court nor its rules and procedures depend upon the discretion of the conflicting states. The total number of disputes submitted before these courts has significantly increased, which demonstrates a growing willingness by states to resolve their conflicts through binding judicial settlement (Malanczuk, 1997:281; Vinogradov *et al*, 2003:33).

2.1. International Court of Justice

The ICJ, which is also called "*the World Court*", replaced the Permanent Court of International Justice (Vinogradov *et al*, 2003:33). Many transboundary disputes have been referred to the ICJ in which riparian sates opt for the World Court over regional courts. An example in this instance includes the Botswana-Namibian dispute over the Okavango River basin) (Arnold, 2013). States' consent to appear before the Court may be obtained in a number of ways. First, this can be done by a special agreement between the parties to a dispute. Second, if the disputing states are parties to an already existing international treaty that provides for compulsory adjudication by the Court, this could constitute the basis for consent to adjudicate, should other means of settlement have been exhausted. A third basis for consent may occur where the disputing states have, by unilateral declaration, accepted compulsory jurisdiction of

the Court independently of each other. The Court has extensive practice in resolving boundary delimitation disputes, which involves the application of equitable principles and often concerns transboundary watercourses (Malanczuk, 1997:281; Vinogradov *et al*, 2003:34).

ANNEXES

Annexure A

Treaty on the Lesotho highlands water project between the government of the Kingdom of Lesotho and the government of the Republic of South Africa signed at Maseru, 24 October 1986

PREAMBLE

The Government of the Kingdom of Lesotho and the Government of the Republic of South Africa (hereinafter called the Parties);

CONSIDERING the value of the water resources in Southern Africa;

RECOGNISING the advantages of regional development and that co-operation between the Parties with regard to the development of mutual water resources can significantly contribute towards the peace and prosperity of the Southern African region and the welfare of its peoples;

DESIRING to enhance the conditions of life of the people of the Kingdom of Lesotho and the Republic of South Africa by raising the level of development of those resources;

CONSIDERING the mutual benefits for the Kingdom of Lesotho and the Republic of South Africa to be derived from the enhancement, conservation and equitable sharing of the water resources of the Senqu/Orange River and its affluents, and taking account of their particular natural advantages; and

WISHING to promote the traditions of good neighbourly relations and peaceful co-operation between the Parties: hereby agree as follows:

Article 1 - Definitions

(1) In this Treaty, unless inconsistent with the context:

"Average Annual Electricity Price" means: the average unit price of all electricity sold in any one year by ESCOM or its successors in the Republic of South Africa, which price is published in the annual reports and accounts of ESCOM or its successors;

"Customs Union Agreement" means: the Customs Union Agreement of 11 December 1969 between the Governments of the Republic of South Africa, Botswana, Lesotho and Swaziland and all memoranda and addenda thereto;

"Customs Union" means: the Customs Union established in terms of the Customs Union Agreement;

"Designated Delivery Point" means: that point, situated at the Caledon River, in the conveyance system connecting the tailpond dam of the hydro-electric power complex of the Project with the Designated Outlet Point;

"Designated Outlet Point" means: that point of outlet of the conveyance system connecting the tailpond dam of the hydro-electric power complex of the Project to the catchment of the Ash River in the Republic of South Africa or such other point or points as may be agreed upon by the Parties;

"Due Date" means: the date at which payments in terms of paragraphs (15), (16), (17) and (18) of Article 12 and paragraph (1) of Article 13 become due, which date in each instance is specified in accordance with the provisions of paragraph (21) of Article 12 and paragraph (2) of Article 13, as the case may be;

"Financial Year" means: a period of twelve months commencing 1 April of any given year and ending 31 March of the following year, both dates inclusive;

"Hydrological Year" means: a period of twelve months commencing 1 October of any given year and ending 30 September of the following year, both dates inclusive;

"Internationally Recognised Standards" means: the best relevant national or international standard of competence, expertise and practice;

"Lesotho" means: the Government of the Kingdom of Lesotho;

"Lesotho Central Bank" means: the Central Bank of Lesotho established by the Lesotho Monetary Authority Act, 1978;

"Nominal Annual Yield" means: that quantity of water determined from time to time in accordance with the provisions of paragraph (5) of Article 7;

"Present Value" means: the 1995 equivalent value of costs, computed in accordance with the procedures set out in the Royalty Manual;

"Production Price Index" means: the Production Prices Index (Commodities for South African Consumption) issued monthly by the Central Statistical Services of South Africa;

"Project" means: that water delivery project ultimately delivering seventy cubic metres of water per second consequent upon the implementation of the phases provided for in paragraph (1) of Article 5 as well as the concomitant hydro-electric power project identified in Annexure I;

"Project Implementation" means: all the steps required to complete the Project to its operating state including studies, investigations, designs, procurement of equipment, construction and commissioning;

"Project Works" means: all constructions, installations, facilities, equipment, supplies and infrastructure of a temporary or permanent nature comprising the Project or required for implementing the Project;

"Royalty Manual" means: the technical document denoted as such and agreed to by the Parties by way of Protocol I to this Treaty and annexed thereto;

"SACU Study" means: the technical document denoted as such and agreed to by the Parties by way of Protocol II to this Treaty and annexed thereto;

"Scheduled Monthly Demand" means: that portion of the minimum quantity of water specified for any one calendar year in Annexure II scheduled by the Lesotho Highlands Development Authority in operation plans compiled in terms of paragraph (7) of Article 7 for delivery each month during such year;

"South Africa" means: the Government of the Republic of South Africa;

"South African Reserve Bank" means: the central bank of the Republic of South Africa operating in terms of the South African Reserve Bank Act. No 29 of 1944; and cognate expressions shall be construed accordingly.

(2) "Delivery to South Africa" shall mean delivery at the Designated Delivery Point and cognate expressions shall be construed accordingly.

(3) The term "phase" shall include "sub-phase" unless otherwise indicated or inconsistent with the context.

(4) The terms "Article" and "Annexure" mean respectively an Article of, and an Annexure to, this Treaty. Except as otherwise indicated, reference to a paragraph is to a paragraph in the Article or in the Annexure in which the reference is made.

(5) Annexures I to III shall be read with and shall form an integral part of this Treaty.

Article 2 - Designated authorities at Government Level

(1) Unless otherwise specified in this Treaty, the Parties respectively designate the following authorities to implement the provisions of this Treaty:

(a) on the part of Lesotho, the Ministry of Water, Energy and Mining or such other Ministry as may be designated from time to time in order to implement specific provisions of this Treaty; and

(b) on the part of South Africa, the Department of Water Affairs or such other Departments of State as may be designated from time to time in order to implement specific provisions of this Treaty.

(2) Each Party shall have the power to effect changes to any such designation provided for in paragraph (1) and shall promptly notify, as far as possible in advance, the other Party of any such change.

Article 3 - Purpose of the Treaty

The purpose of this Treaty shall be to provide for the establishment, implementation, operation and maintenance of the Project.

Article 4 - Purpose of the Project

(1) The purpose of the Project shall be to enhance the use of the water of the Senqu/Orange River by storing, regulating, diverting and controlling the flow of the Senqu/Orange River and its affluents in order to effect the delivery of specified quantities of water to the Designated Outlet Point in the Republic of South Africa and by utilizing such delivery system to generate hydro-electric power in the Kingdom of Lesotho.

(2) Without prejudice to the provisions of paragraph (1) each Party shall be allowed the opportunity to undertake ancillary developments in its territory including:

(i) the provision of water for irrigation, potable water supply and other uses;
(ii) the development of other projects to generate hydro-electric power, and
(iii) the development of tourism, fisheries and other projects for economic and social development.

Article 5 - Project Implementation

(1) The Project shall be implemented by way of any or all of the phases described in Annexure I or such additional phases as may be required ultimately to deliver seventy cubic metres of water per second: Provided that any phase described in Annexure I may be modified by agreement between the Parties.

(2) Unless the Parties decide otherwise each phase of the Project shall be implemented in time to satisfy the minimum water deliveries as specified in Annexure II. Water deliveries to South Africa from Sub-phase IA of the Project shall be due to commence in the year 1995 and water deliveries to South Africa from Sub-phase IB of the Project shall be due to commence in the year 2002.

(3) The conveyance systems for the discharge from the most downstream hydro-electric power station in the Kingdom of Lesotho shall be designed, built, operated and maintained in such a manner that neither Party shall be in a position to interfere unilaterally with the flow of water to the Designated Delivery Point.

(4) The conveyance systems referred to in paragraph (3) shall be designed, built, operated and maintained in such a manner that:

(a) the hydro-electric power generation shall not be affected when, for any reason, all or part of the water due to be delivered to South Africa cannot be received at the Designated Outlet Point: and

(b) the flow of water to the Designated Outlet Point shall not be impaired when, for any reason, all or part of the water due to be delivered to South Africa cannot be passed through the hydro-electric power complex forming part of the Project.

(5) The outlet facilities at the dam of the tailpond reservoir of the hydro-electric power complex forming part of the Project shall be designed, built, operated and maintained in such a manner that the maximum discharge from such outlet facilities other than a discharge by means of a spillway, cannot exceed eight cubic metres of water per second.

Article 6 - General Duties Regarding the Project

(1) The Parties shall use their best endeavours to secure and facilitate the implementation of the Project: Provided that the implementation of each phase of the Project subsequent to Phase I, shall be subject to the consent of each Party prior to such implementation and provided further that, without prejudice to the provisions of Article 12, a Party not consenting to the implementation of any such subsequent phase of the Project shall compensate the other Party for any wasted Project implementation costs reasonably expended by such other Party in anticipation of the implementation of such subsequent phase.

(2) Lesotho shall, in accordance with the provisions of this Treaty, have the overall responsibility for that part of the Project situated in the Kingdom of Lesotho and the security thereof.

(3) South Africa shall, in accordance with the provisions of this Treaty, have the overall responsibility for that part of the Project situated in the Republic of South Africa and the security thereof.

(4) Lesotho shall establish the Lesotho Highlands Development Authority as an autonomous statutory body under the laws of the Kingdom of Lesotho in accordance with the provisions of this Treaty.

(5) South Africa shall establish the Trans-Caledon Tunnel Authority as an autonomous statutory body by means of appropriate legislation in accordance with the provisions of this Treaty.

(6) The Parties hereby establish the Joint Permanent Technical Commission in accordance with the provisions of this Treaty.

(7) Lesotho shall, in accordance with the provisions of this Treaty, ensure the delivery of such quantities of water as specified in Annexure II, to South Africa.

(8) Neither of the Parties shall cause or permit under any circumstance nor for any reason whatsoever any unilateral interference with the delivery of water to the Designated Outlet Point.

(9) Lesotho shall, in accordance with the provisions of this Treaty, ensure that minimum rates of flow as provided for in Article 7 be maintained in the natural river channel downstream of each of the Project dams.

(10) Each Party shall, in respect of its territory, provide the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority respectively, with all powers, authorizations, exemptions and rights necessary for the implementation, operation and maintenance of the Project, including the procurement of land and interest in land. Each Party shall engage its best endeavours to assist any such Authority in obtaining, in an expeditious manner so as not to delay the Project, land or any interest in land required for such purposes.

(11) Each Party shall provide the Lesotho Highlands Development Authority, the Trans-Caledon Tunnel Authority, and the Joint Permanent Technical Commission, respectively with all the necessary access rights required in the course of the implementation, operation and maintenance of the Project.

(12) The Parties shall, subject to the normal requirements of national legislation, secure the granting of visas and other travel documents to personnel engaged in the implementation, operation and maintenance of the Project and shall ensure the necessary freedom of access to the locations of the Project Works to such personnel.

(13) Each Party shall enact appropriate legislation to enable it to give effect to the terms of this Treaty and shall ensure that all such legislation be enacted in time to allow for the effective implementation, operation and maintenance of the Project.

(14) The implementation, operation, maintenance, safety inspection and monitoring procedures of the Project Works shall be carried out in accordance with Internationally Recognized Standards.

(15) Lesotho shall take the necessary measures to prevent or abate any significant pollution of the water to be delivered to South Africa. The Parties shall consult through the Joint Permanent Technical Commission with a view to reaching agreement with regard to the defrayment of the costs for prevention or abatement of pollution caused by adverse effects of the Project.

(16) Notwithstanding the tied finance or tied finance guarantee requirements of financing institutions, tendering for the Project Works shall be by competitive bidding without discrimination as to the nationality of any tenderer, unless the Parties approve of such requirements. The approval of South Africa shall not be required with regard to such tied finance or tied finance guarantee requirements in respect of that part of the Project Works solely concerned with generating hydro-electric power in the Kingdom of Lesotho, unless only tenderers of South African nationality are precluded from tendering in terms of such requirements.

(17) The consulting services relating to the delivery of water to South Africa shall allow for the contribution of consultants nominated by South Africa to the extent of not less than fifty percent in value with regard to that part of the Project situated in the Kingdom of Lesotho.

(18) Neither Party shall apply quantitative restrictions on goods, materials, plant, equipment or services, whether produced or manufactured in the territory of any of the Parties or imported from outside such territories, required for the implementation, operation or maintenance of the project or any phase thereof. The procurement of all such goods, materials, plant, equipment or services shall be without any restriction whatsoever as regards the primary or secondary source of supply except as may be required by tied finance or tied finance guarantee arrangements and shall be without prejudice to the provisions of paragraphs (16) and (17).

Article 7 - Lesotho Highlands Development Authority

(1) The Lesotho Highlands Development Authority shall have the responsibility for the implementation, operation and maintenance of that part of the Project situated in the Kingdom of Lesotho, in accordance with the provisions of this Treaty and shall be vested with all powers necessary for the discharge of such responsibilities.

(2) Subsequent to the implementation of Sub-phase IA of the Project, the Lesotho Highlands Development Authority shall annually deliver such minimum quantities of water as specified for each calendar year in Annexure II, to South Africa at the Designated Delivery Point: Provided that any shortfall in the delivery of the minimum quantity of water specified for any calendar year in Annexure II may be recouped utilizing water delivered in excess of the Scheduled Monthly Demands during the six months following the end of such year which quantity of water so utilized shall constitute part of the water deliveries for the calendar year in respect of which the shortfall is recouped and provided further that on the request of South Africa, the annual quantities of water specified in Annexure II shall be adjusted in accordance with changes as projected by South Africa in the water use requirements in the Republic of South Africa and provided further that adjustments shall be made to only those annual quantities of water specified in Annexure II which exceed the total of the Nominal Annual Yield and the yield forecast by the Lesotho Highlands Development Authority for Sub-phase IB or as the case may be, the total of the Nominal Annual Yield and such yield forecast by such Authority for any phase of the Project which is being implemented at the time of such adjustment which yield forecasts shall be established on the same basis as the Nominal Annual Yield.

(3) Without prejudice to the provisions of paragraph (2), the Lesotho Highlands Development Authority shall, up to the date water deliveries from Phase II of the Project commence, annually deliver to South Africa the quantity of water equal to the Nominal Annual Yield: Provided that the Lesotho Highlands Development Authority shall not be obliged to deliver to South Africa the quantity of water in excess of the minimum quantity specified for the relevant year in Annexure II required for the initial filling of reservoirs forming part of the Project and provided further that in the event of insufficient inflow into the storage reservoirs forming part of the Project, the Lesotho Highlands Development Authority shall be obliged to deliver only such quantity of water in excess of the minimum specified for that particular year in Annexure II as shall be prescribed by reservoir operating rules constituted by the applicable operation plan compiled in accordance with the provisions of paragraph (7).

(4) The quantity of water to be delivered in each calendar year by the Lesotho Highlands Development Authority to South Africa either in terms of paragraph (2) or (3) as the case may be, shall be delivered in monthly quantities scheduled in operation plans established in accordance with the provisions of paragraph (7).

(5) The Lesotho Highlands Development Authority shall from time to time establish the Nominal Annual Yield which shall be that quantity of water, the annual delivery of which from the phases of the Project implemented at that stage can be maintained continuously on a long term basis with a reliability of ninety-eight per cent.

(6) In the event of the storage reservoirs forming part of the Project being at full storage capacity, the Lesotho Highlands Development Authority may, if agreed to by South Africa, and in accordance with reservoir operating rules constituted by the applicable operation plan compiled in accordance with the provisions of paragraph (7), deliver to South Africa in any one calendar year, water in excess of the Nominal Annual Yield: Provided that should South Africa not agree to such delivery the Lesotho Highlands Development Authority shall have the right to pass such water through the hydro-electric power complex forming part of the Project.

(7) The Lesotho Highlands Development Authority shall, two months prior to the end of 1994 and the end of each subsequent calendar year, compile for the ensuing calendar year, operation plans in respect of all water deliveries to South Africa as provided for in this Article as well as the generation of hydro-electric power in the Kingdom of Lesotho. Such plans shall allow for operational contingencies and shall be adjusted and updated during the course of such calendar year whenever changing circumstances necessitate such adjustment and updating.

(8) The Lesotho Highlands Development Authority shall monitor the quantity of water delivered to South Africa and, Jointly with the Trans-Caledon Tunnel Authority, shall at the end of each calendar month take the measure of the quantity of water so delivered during that month, at the measuring point in the conveyance system connecting the tailpond dam of the hydro-electric power complex of the Project with the Designated Outlet Point: Provided that if the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority should dispute such measurement the Joint Permanent Technical Commission shall resolve such dispute by determining the quantity of water which shall be deemed to have been delivered to South Africa.

(9) The Lesotho Highlands Development Authority shall at all times maintain rates of flow in the natural river channels immediately downstream of the Katse and Mohale dams of not less than five hundred and three hundred litres per second respectively and shall, if so required, release the quantities of water, from either the Katse or Mohale reservoirs as the case may be, necessary to maintain such rates of flow: Provided that subsequent to the implementation of Phase II of the Project, such rates of flow may be adjusted by agreement between the Parties and provided further that in the event of either reservoir being at its minimum operating level, the quantities of water released shall be equal to the flow rate into such reservoir not in excess of the specified rate of release.

(10) The Lesotho Highlands Development Authority shall on the request of Lesotho release into the natural river channels downstream of the headpond and tailpond reservoirs forming part of the hydro-electric power complex the quantities of water which have originated in the catchment areas of these reservoirs. In the event of such quantities not being released by way of overflow from such reservoirs, the relevant quantities shall be released through the low level outlets of such reservoirs.

(1l) Prior to the implementation of any phase subsequent to Phase I, the minimum rate of flow to be maintained in the natural river channels downstream of dams forming part of such phase, shall be established by agreement between the Parties.

(12) Without prejudice to the provisions of paragraph (2) of Article 17 the minimum rate of flow to be maintained in the Senqu/Orange River from the Kingdom of Lesotho to the Republic of South Africa, shall be established by agreement between the Parties from time to time.

(13) The Lesotho Highlands Development Authority shall, of the water to be delivered to South Africa in terms of this Treaty, release such quantity as may be requested by either Party and subject to agreement by the other Party, downstream of any storage reservoir forming part of the Project: Provided that the Joint Permanent Technical Commission shall establish the procedure to be followed in the event of such releases including the measurement of such quantities of water.

(14) The Lesotho Highlands Development Authority shall, of the water to be delivered to South Africa in terms of this Treaty, release such quantity as may be requested by Lesotho and subject to agreement by South Africa, at abstraction points in the conveyance system upstream of the hydro-electric power complex of the Project Provided that the joint Permanent Technical Commission shall establish the procedure to be followed in the event of such abstractions including the measurement of such quantities of water.

(15) The Lesotho Highlands Development Authority shall provide the Joint Permanent Technical Commission with all information, as and when required by such Commission, regarding all operational aspects of any phase of the Project implemented at that stage.

(16) The Lesotho Highlands Development Authority shall give its full co-operation to the Joint Permanent Technical Commission and shall give full effect to the applicable provisions of Article 9.

(17) The Lesotho Highlands Development Authority shall carry out its functions in accordance with Internationally Recognized Standards of managerial and technical competence, expertise and practice and to this end shall appoint, whenever appropriate, project management, design, financial or other consultants.

(18) The Lesotho Highlands Development Authority shall effect all measures to ensure that members of local communities in the Kingdom of Lesotho, who will be affected by flooding, construction works, or other similar Project related causes, will be enabled to maintain a standard of living not inferior to that obtaining at the time of first disturbance: Provided that such Authority shall effect compensation for any loss to such member as a result of such Project related causes, not adequately met by such measures.

(19) The Lesotho Highlands Development Authority shall, as provided for in paragraph (6) of Article 10, establish comprehensive accounting and costing systems in accordance with the recommendations of financial management system consultants.

Such systems shall be subject to periodical review. The Joint Permanent Technical Commission shall have the right to request such review.

(20) The Lesotho Highlands Development Authority shall establish effective and comprehensive management information systems including performance indicators, which shall be used to provide the information required for management decision making during the implementation, operation and maintenance of that part of the Project entrusted to such Authority.

(21) The Lesotho Highlands Development Authority shall, on the basis of the accounting and casting systems and procedures referred to in paragraph (19), apportion all costs incurred by such Authority as costs attributable to the delivery of water to South Africa and costs attributable to the generation of hydro-electric power in the Kingdom of Lesotho as well as for developments envisaged by the provisions of paragraph (2) of Article 4.

(22) The Lesotho Highlands Development Authority shall effect all necessary catchment conservation measures as well as all measures necessary to prevent pollution of the water to be delivered to South Africa and pollution caused by the adverse effects of the implementation of the Project.

(23) The Lesotho Highlands Development Authority shall, at least six months prior to the commencement of each phase of the Project and thereafter during the course of the implementation, operation and maintenance such phase at least four months prior to the commencement of each Financial Year, separately, in respect of that part of the project relating to the delivery of water to South Africa and in respect of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho, compile:

(a) a long term cost plan. Such plan shall differentiate between capital and operating costs and shall identify the total estimated expenditure for such phase and contain an analysis of such expenditure on an annual basis. Such plan shall further include an estimate of contingency costs on an annual basis covering the period of the long term cost plan;

(b) a detailed cost plan covering the ensuing Financial Year. Such plan shall differentiate between capital and operating costs and shall identify the total estimated expenditure for such year and contain an analysis of such expenditure on a monthly basis. Such plan shall further include an estimate of contingency costs with regard to such Financial Year as well as each month covered;

(c) a long term funding plan identifying the total funding for such phase by way of loans, credit facilities and other borrowings and shall provide an analysis thereof on an annual basis;

(d) a short term funding plan for the ensuing Financial Year identifying the total funding for such year by way of loans, credit facilities or other borrowings and shall provide an analysis thereof on a monthly basis;

(e) a schedule of the repayment of all loans, credit facilities and other borrowings covering the repayment of capital, interest and financing charges;

(f) a long term cash flow forecast for such phase and shall provide an analysis of such cash flow on an annual basis. Such forecast shall *inter alia*identify any foreign exchange requirements; and

(g) a detailed cash flow forecast for the ensuing Financial Year, and shall provide an analysis of such cash flow on a monthly basis. Such forecast shall *inter alia* identify any foreign exchange requirements.

(24) The Lesotho Highlands Development Authority shall compile, at regular intervals, reconciliation statements with regard to all long term plans, forecasts and schedules referred to in paragraph (23) and shall update them to the extent necessitated by such reconciliation: Provided that such plans, forecasts or schedules shall further be reconciled and updated whenever an event or occurrence results in a significant variation thereof.

(25) The Lesotho Highlands Development Authority shall compile on a monthly basis reconciliation statements with regard to all short term plans and forecasts referred to in paragraph (23) and shall account for any significant difference regarding any such plans or forecasts. Such plans and forecasts shall be updated on a monthly basis to the extent necessitated by such reconciliation.

(26) The books and accounts of the Lesotho Highlands Development Authority shall be subject to annual and independent external auditing by chartered accountants.

(27) The Lesotho Highlands Development Authority shall establish separate banking accounts for:

(a) all amounts received from South Africa as cost related payments as provided for in Article 10 as well as amounts drawn down on loans or other borrowings procured for the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa; and

(b) all amounts received from Lesotho as cost related payments as provided for in Article 10 as well as all amounts drawn down on loans and other borrowings procured for the implementation, operation and maintenance of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho or for the developments envisaged by the provisions of paragraph (2) of Article 4.

Such banking accounts shall be established with the Central Bank of Lesotho or such other banking institution as approved, in respect of amounts referred to in sub-paragraph (a), by the Joint Permanent Technical Commission and in respect of amounts referred to in sub-paragraph (b) by Lesotho.

(28) The Lesotho Highlands Development Authority shall, if necessary to meet foreign expenditure and subject to the approval of the appropriate authorities of both Parties, establish with banking institutions outside the territory of either Party separate banking

and deposit accounts for all moneys drawn down on loans and other borrowings obtained from outside such territories and procured for the implementation, operation and maintenance of that part of the Project:

(a) relating to the delivery of water to South Africa; and

(b) relating to the generation of hydro-electric power in the Kingdom of Lesotho or for the developments envisaged by the provisions of paragraph (2) of Article 4.

(29) All moneys held by the Lesotho Highlands Development Authority in any banking account and not immediately required to effect any payment shall be placed on deposit at market related interest rates.

(30) All interest accruing on moneys in the accounts referred to in paragraphs (27) and (28) shall be utilized exclusively for the implementation, operation and maintenance of that part of the Project for which the moneys bearing such interest shall have been obtained.

(31) The Lesotho Highlands Development Authority shall take out insurance against all loss or damage from whatever cause and against risks and public liabilities, which may arise in the course of implementing, operating and maintaining that part of the Project which is entrusted to such Authority on the basis of normal commercial considerations.

(32) All managerial and professional staff positions of the Lesotho Highlands Development Authority shall be filled by personnel in possession of appropriate qualifications and experience for such appointments.

(33) The Lesotho Highlands Development Authority shall be managed and controlled by a Board of Directors which shall be appointed by Lesotho and shall comprise a Chairman and such other members as shall be appointed on merit for their managerial, technical and financial qualifications and experience.

(34) The Board of Directors shall establish the policy of the Lesotho Highlands Development Authority in accordance with the provisions of this Treaty giving priority to its duties arising from the delivery of water to South Africa and the generation of hydro-electric power in the Kingdom of Lesotho as its primary functions.

(35) Lesotho shall appoint a Chief Executive who shall have appropriate qualifications and experience for such appointment.

(36) The Chief Executive shall implement the policies laid down by the Board of Directors of the Lesotho Highlands Development Authority.

(37) The Chief Executive of the Lesotho Highlands Development Authority shall be under the obligation to consult with and to give his full co-operation to the Joint Permanent Technical Commission.

(38) In carrying out his duties and in implementing the policies established by the Board of Directors the Chief Executive shall *inter alia* be responsible for:

(a) presenting proposals concerning the implementation, operation and maintenance of that part of he Project which is entrusted to the Lesotho Highlands Development Authority and concerning the internal administration and procedures of such Authority to the Board of Directors and to the Joint Permanent Technical Commission for approval;

(b) preparing and presenting to the Board of Directors and the Joint Permanent Technical Commission for approval the annual budget and proposals for borrowings of the Lesotho Highlands Development Authority;

(c) controlling the expenditure and borrowings of the Lesotho Highlands Development Authority within limits set by the Board of Directors and ensuring that the costs incurred are accurately recorded and allocated to the appropriate cost centre;

(d) providing the Board of Directors and the Joint Permanent Technical Commission with the information they require or request for the discharge of their duties;

(e) issuing all tender documents and signing agreements, undertakings and contracts on behalf of the Lesotho Highlands Development Authority;

(f) appointing and terminating the appointment of all managerial professional and administrative staff; and

(g) such other duties as the Board of Directors may from time to time assign to such Chief Executive.

(39) The Office of the Chief Executive of the Lesotho Highlands Development Authority shall act as the main channel of communication between such Authority and the Joint Permanent Technical Commission.

(40) The Chief Executive of the Lesotho Highlands Development Authority shall give advance notification of at least five calendar days to the Joint Permanent Technical Commission of all meetings provided for in paragraph (21) of Article 9 and shall provide copies of all relevant documents in good time.

Article 8 - Trans-Caledon Tunnel Authority

(1) The Trans-Caledon Tunnel Authority shall have the responsibility for the implementation, operation and maintenance of that part of the project in the Republic of South Africa, in accordance with the provisions of this Treaty, and shall he vested with all powers necessary for the discharge of such responsibilities.

(2) Notwithstanding the provisions of paragraph (1) of Article 7, the Trans-Caledon Tunnel Authority may be entrusted by the Parties, furthermore, with the responsibility for the implementation, operation and maintenance of that part of the water conveyance system situated in the Kingdom of Lesotho; for this purpose, the Trans-Caledon Tunnel Authority shall be vested by Lesotho with all powers, authorizations and exemptions necessary for the discharge of such responsibilities and shall furthermore maintain close liaison with the Lesotho Highlands Development Authority

in relation to the implementation of the water conveyance system without prejudice, however, to the title or any other rights in respect of the said water conveyance system and related land.

(3) The Trans-Caledon Tunnel Authority shall monitor the quantity of water delivered to South Africa and, jointly with the Lesotho Highlands Development Authority, shall at the end of each calendar month take the measure of the quantity of water so delivered during that month, at the measuring point in the conveyance system connecting the tailpond dam of the hydro-electric power complex of the Project with the Designated Outlet Point: Provided that if the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority should dispute such measurement the Joint Permanent Technical Commission shall resolve such dispute by determining the quantity of water which shall be deemed to have been delivered to South Africa.

(4) The Trans-Caledon Tunnel Authority shall provide the Joint Permanent Technical Commission with all information as and when required by such Commission, regarding all operational aspects of any phase of the Project implemented at that stage.

(5) The Trans-Caledon Tunnel Authority shall give its full co-operation to the Joint Permanent Technical Commission and shall give full effect to the applicable provisions of Article 9.

(6) The Trans-Caledon Tunnel Authority shall carry out its functions in accordance with Internationally Recognized Standards of managerial and technical competence, expertise and practice and to this end shall appoint, whenever appropriate, project management, design, financial or other consultants.

(7) The Trans-Caledon Tunnel Authority shall as provided for in paragraph (6) of Article 10, establish comprehensive accounting and costing systems in accordance with the recommendations of financial management system consultants. Such systems shall be subject to periodical review. The Joint Permanent Technical Commission shall have the right to request such review.

(8) The Trans-Caledon Tunnel Authority shall establish effective and comprehensive management information systems including performance indicators, which shall be used to provide the information required for management decision making during the design, implementation, operation and maintenance of that part of the Project entrusted to such Authority.

(9) The Trans-Caledon Tunnel Authority shall, on the basis of the accounting and costing systems and procedures referred to in paragraph (7), apportion all costs incurred by such Authority as costs attributable to the delivery of water to South Africa and costs attributable to the generation of hydro-electric power in the Kingdom of Lesotho as well as for developments envisaged by the provisions of paragraph (2) of Article 4.

(10) The Trans-Caledon Tunnel Authority shall effect all necessary catchment conservation measures as well as all measures necessary to prevent pollution of the

water to be delivered to South Africa and pollution caused by the adverse effects of the implementation of the Project.

(1l) The Trans-Caledon Tunnel Authority shall, at least six months prior to the commencement of each phase of the Project and thereafter during the course of the implementation, operation and maintenance of such phase at least four months prior to the commencement of each Financial Year, separately, in respect of that part of the Project relating to the delivery of water to South Africa and in respect of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho, compile:

(a) a long term cost plan. Such plan shall differentiate between capital and operating costs and shall identify the total estimated expenditure for such phase and contain an analysis of such expenditure on an annual basis. Such plan shall further include an estimate of contingency costs on an annual basis covering the period of the long term cost plan;

(b) a detailed cost plan covering the ensuing Financial Year. Such plan shall differentiate between capital and operating costs and shall identify the total estimated expenditure for such year and contain an analysis of such expenditure on a monthly basis. Such plan shall further include an estimate of contingency costs with regard to such Financial Year as well as each month covered;

(c) a long term funding plan identifying the total funding for such phase by way of loans, credit facilities or other borrowings and shall provide an analysis thereof on an annual basis;

(d) a short term funding plan for the ensuing Financial Year identifying the total funding for such year by way of loans, credit facilities or other borrowings and shall provide an analysis thereof on a monthly basis;

(e) a schedule of the repayment of all loans, credit facilities and other borrowings, covering the repayment of capital, interest and financing charges;

(f) a long term cash flow forecast for such phase and shall provide an analysis of such cash flow on an annual basis. Such forecast shall *inter alia*identify any foreign exchange requirements; and

(g) a detailed cash flow forecast for the ensuing Financial Year, and shall provide an analysis of such cash flow on a monthly basis. Such forecast shall *inter alia* identify any foreign exchange requirements.

(12) The Trans-Caledon Tunnel Authority shall compile, at regular intervals, reconciliation statements with regard to all long term plans, forecasts and schedules referred to in paragraph (11) and shall update them to the extent necessitated by such reconciliation:

Provided that such plans, forecasts or schedules shall further be reconciled and updated whenever an event or occurrence results in a significant variation thereof.

(13) The Trans-Caledon Tunnel Authority shall compile on a monthly basis reconciliation statements with regard to all short term plans and forecasts referred to in paragraph (11) and shall account for any significant difference regarding any such plans or forecasts. Such plans and forecasts shall be updated on a monthly basis to the extent necessitated by such reconciliation.

(14) The books and accounts of the Trans-Caledon Tunnel Authority shall be subject to annual and independent external auditing by chartered accountants.

(15) The Trans-Caledon Tunnel Authority shall establish separate banking accounts for:

(a) all amounts received from South Africa as cost related payments as provided for in Article 10 as well as all amounts drawn down on loans or other borrowings procured for the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa; and

(b) all amounts received from Lesotho as cost related payments as provided for in Article 10 as well as all amounts drawn down on loans and other borrowings procured for the implementation, operation and maintenance of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho or for the developments envisaged by the provisions of paragraph (2) of Article 4.

Such accounts shall be established with the South African Reserve Bank or such other banking institution as approved, in respect of amounts referred to in sub-paragraph (a), by South Africa and in respect of amounts referred to in sub-paragraph (b) by the Joint Permanent Technical Commission.

(16) The Trans-Caledon Tunnel Authority shall, if necessary to meet foreign expenditure and subject to the approval of the appropriate authorities in the Republic of South Africa, establish with banking institutions outside the territory of either Party separate banking accounts for all moneys drawn down on loans and other borrowings obtained from outside such territories and procured for the implementation, operation and maintenance of that part of the Project:

(a) relating to the delivery of water to South Africa: and

(b) relating to the generation of hydro-electric power in the Kingdom of Lesotho or for the developments envisaged by the provisions of paragraph (2) of Article 4.

(17) All moneys held by the Trans-Caledon Tunnel Authority in any banking account and not immediately required to effect any payment, shall be placed on deposit at market related interest rates.

(18) All interest accruing on moneys in the accounts referred to in paragraphs (15) and (16) shall be utilized exclusively for the implementation, operation and maintenance of that part of the Project for which the moneys bearing such interest shall have been obtained.

(19) The Trans-Caledon Tunnel Authority shall take out insurance against all loss or damage from whatever cause and against all risks and public liabilities which may arise in the course of implementing, operating and maintaining that part of the Project entrusted to such Authority, on the basis of normal commercial considerations.

(20) All managerial and professional staff positions of the Trans-Caledon Tunnel Authority shall be filled by personnel in possession of appropriate qualifications and experience for such appointments.

(21) The Trans-Caledon Tunnel Authority shall be managed and controlled by a Board of Directors appointed by South Africa, and shall comprise a Chairman and such other members as shall be appointed on merit for their managerial, technical and financial qualifications and experience.

(22) The Board of Directors shall establish the policy of the Trans-Caledon Tunnel Authority in accordance with the provisions of this Treaty giving priority to its duties arising from the delivery of water to South Africa and the generation of hydro-electric power in the Kingdom of Lesotho.

(23) The Board of Directors of the Trans-Caledon Tunnel Authority shall appoint a Chief Executive who shall have appropriate qualifications and experience for such appointment.

(24) The Chief Executive shall implement the policies laid down by the Board of Directors of the Trans-Caledon Tunnel Authority.

(25) The Chief Executive of the Trans-Caledon Tunnel Authority shall be under the obligation to consult with and to give his full co-operation to the Joint Permanent Technical Commission.

(26) In carrying out his duties and in implementing the policies established by the Board of Directors the Chief Executive shall *inter alia* be responsible for:

(a) presenting proposals concerning the implementation, operation and maintenance of that part of the Project entrusted to the Trans-Caledon Tunnel Authority and concerning the internal administration and procedures of such Authority to the Board of Directors and to the Joint Permanent Technical Commission for approval;

(b) preparing and presenting to the Board of Directors and the Joint Permanent Technical Commission for approval the annual budget and proposals for borrowings of the Trans-Caledon Tunnel Authority;

(c) controlling the expenditure and borrowings of the Trans-Caledon Tunnel Authority within limits set by the Board of Directors and ensuring that the costs incurred are accurately recorded and allocated to the appropriate cost centre;

(d) providing the Board of Directors and the Joint Permanent Technical Commission with the information they require or request for the discharge of their duties;

(e) issuing all tender documents and signing all agreements, undertakings and contracts on behalf of the Trans-Caledon Tunnel Authority;

(f) appointing and terminating the appointment of all managerial, professional and administrative staff; and

(g) such other duties as the Board of Directors may from time to time assign to such Chief Executive.

(27) The Office of the Chief Executive of the Trans-Caledon Tunnel Authority shall act as the main channel of communication between such Authority and the Joint Permanent Technical Commission.

(28) The Chief Executive of the Trans-Caledon Tunnel Authority shall give advance notification of at least five calendar days to the Joint Permanent Technical Commission of all meetings provided for in paragraph (21) of Article 9 and shall provide copies of all relevant documents in good time.

Article 9 - Joint Permanent Technical Commission

(1) The Joint Permanent Technical Commissions is composed of two delegations, one from each Party. Each Party shall nominate three representatives constituting its delegation, as well as an alternate for each of the nominated resident in Maseru. Each delegation shall alternately nominate a chairman for meetings of the Joint Permanent Technical Commission.

(2) Each Party shall, within three months of the signature of this Treaty, nominate its representatives on the Joint Permanent Technical Commission as well as alternates for such representatives and shall such period communicate the names of such nominees to the other Party. Each Party may at any time terminate any such nomination and nominate any other person instead of a representative or alternate whose nomination has been terminated:

Provided that such termination shall only take effect one month after notice to the other Party.

(3) All decisions of the Joint Permanent Technical Commission shall require the agreement of both delegations.

(4) In the event of the two delegations not being able to reach agreement on any matter, such matter shall be reconsidered at the next meeting of the Joint Permanent Technical Commission which meeting shall be convened at the earliest possible opportunity, but not later than one month after the failure to agree.

(5) In the event of the two delegations not being able to reach agreement on any matter after following the procedure set out in paragraph (16) the Joint Permanent Technical Commission shall refer the matter to the Parties.

(6) The Joint Permanent Technical Commission shall establish its own rules of procedures and shall establish the necessary regulations with regard to meetings, technical, administrative and financial activities.

(7) The Joint Permanent Technical Commission shall possess full legal personality in the territory of each Party.

(8) The Joint Permanent Technical Commission and advisory powers relating to the activities of the Lesotho Highlands Development Authority in so far as such activities may have an effect on the delivery of water to South Africa,

(9) The Joint Permanent Technical Commission shall have monitoring and advisory powers relating to the activities of the Trans-Caledon Tunnel Authority in so far as such activities may have an effect on the generation of hydro-electric power in the Kingdom of Lesotho.

(10) The Joint Permanent Technical Commission shall have the right to subject to management audit, all those aspects of the management, organization and accounts or the Lesotho Highlands Development Authority relating to the delivery of water to South Africa and all those aspects of the management, organization and accounts of the Trans-Caledon Tunnel Authority relating to the generation of hydro-electric power in the Kingdom of Lesotho.

(11) The Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority shall each consult with the Joint Permanent Technical Commission on a continuous basis with regard to all aspects of the matters listed below and any decision of the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority and any organ of such Authorities, with regard to all aspect of such matters, shall require the approval of the Joint Permanent Technical Commission in order to take effect:

(a) the appointment of external auditors for each Authority;

(b) all budgets for the expenditure of or by each such Authority including all cost plans, funding plans and cash flow forecasts and reconciliation statements relating to such plans and forecasts, as provided for in Articles 7 and 8;

(c) implementation plans for each phase of the Project;

(d) annual as well as short term operation plans;

(e) annual maintenance plans;

(f) the design of Project Works, tender procedures and tender documents relating to the implementation, operation and maintenance of the Project;

(g) the appointment of consultants and contractors for the implementation, operation and maintenance of the Project as well as the issuing of variation orders and the settlement of all claims;

(h) the allocation of costs between the Parties in accordance with the provisions of Article 10;

(i) financing arrangements and loan agreements as well as all borrowings from whatever source for the purpose of the implementation of the Project;

(j) the appointment of professional and managerial staff of the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority, other than the Chief Executive of such Authorities;

(k) the establishment and review of comprehensive accounting, costing and management information systems provided for in paragraphs (19) and (20) of Article 7 and paragraphs (7) and (8) of Article 8;

(l) the establishment of accounts with banking institutions;

(m) foreign exchange forward cover on loans, credit facilities or other borrowings;

(n) the taking out of any insurance; and

(o) the determination of the Nominal Annual Yield.

(12) The Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority shall, with regard to any decision requiring the approval of the Joint Permanent Technical Commission, present such decision to the Joint Permanent Technical Commission for approval at the earliest practicable time in order to allow the fullest possible opportunity for adequate consideration.

(13) The approval of the Joint Permanent Technical Commission with regard to all matters referred to in paragraph (11) shall be notified in writing to all parties concerned through the Office of the Secretary.

(14) Notwithstanding the provisions of paragraph (11), any decision of the Lesotho Highlands Development Authority affecting only the generation of hydro-electric power in the Kingdom of Lesotho, and any decision of the Trans-Caledon Tunnel Authority in respect of that part of the Project situated in the Republic of South Africa affecting only the delivery of water to South Africa, shall be exempt from approval of the Joint Permanent Technical Commission.

(15) The Joint Permanent Technical Commission shall hold regular meetings to discuss issues relating to the delivery of water to South Africa and the generation of hydro-electric power in the Kingdom of Lesotho and either delegation shall have the right to request a meeting of the Joint Permanent Technical Commission which shall take place within seven calendar days of the request.

(16) All matters referred to the Joint Permanent Technical Commission for discussion, approval or report by the Lesotho Highlands Development Authority, the Trans-Caledon Tunnel Authority or either delegation or Party shall be dealt with in an expeditious manner. If the Joint Permanent Technical Commission cannot consider a

matter within twelve calendar days, it shall notify the referring party and, where appropriate, request an extension of time for consideration of the matter.

(17) The Joint Permanent Technical Commission shall establish a permanent office in the Kingdom of Lesotho with the necessary staff and facilities.

(18) The Joint Permanent Technical Commission shall appoint a full-time Secretary who shall have appropriate qualifications and experience for such appointment.

(19) The Joint Permanent Technical Commission shall establish the terms of the appointment of the Secretary. The terms of appointment shall *inter alia*provide for the termination of such appointment on the request of either Party.

(20) The Secretary shall, subject to the provisions of paragraph (19), be responsible for supervising the day to day administration of the Joint Permanent Technical Commission and for maintaining effective and efficient support services to both delegations. Such responsibilities shall *inter alia* include:

(a) the maintenance on behalf of, and as directed by, the Joint Permanent Technical Commission of close and efficient working liaison with the Lesotho Highlands Development Authority, the Trans-Caledon Tunnel Authority, and such other persons and bodies as may be required; and

(b) The preparation of the annual budget including cash flow forecasts of the Joint Permanent Technical Commission, and the control of expenditure against the approved budget.

(21) Members of the Joint Permanent Technical Commission shall have the right to attend management meetings and technical working meetings of the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority other than meetings of the Boards of Directors of such authorities respectively.

(22) Members of the Joint Permanent Technical Commission shall have all the necessary access rights required in the course of the implementation, operation and maintenance of the Project.

(23) The Joint Permanent Technical Commission may appoint technical experts and consultants to provide expert opinion and advice whenever this appears to be necessary.

(24) The accounts of the Joint Permanent Technical Commission shall be subject to annual and independent external auditing by chartered accountants appointed by agreement of the Parties.

(25) The Joint Permanent Technical Commission shall be responsible for taking out insurance against all loss or damage from whatever cause, and against risks and public and professional liability, which may arise in the course of discharging the responsibilities entrusted to such Commission as well as loss or damage, risks or public liability arising from acts performed by the Secretary and the personnel of the

Joint Permanent Technical Commission in their official capacity, on the basis of normal commercial considerations.

(26) The costs of establishing the Joint Permanent Technical Commission as well as the working capital necessary for the functioning of the Joint Permanent Technical Commission, shall be shared by the Parties. Each Party shall be liable for the costs of its own delegation and all other costs shall be met by the Parties on an equal basis.

(27) The Joint Permanent Technical Commission and its Secretary as well as the persons nominated by each Party as representatives or alternates to such Commission, shall enjoy such privileges and immunities as provided for in Annexure III.

(28) The Joint Permanent Technical Commission shall establish with a banking institution registered in the Kingdom of Lesotho in terms of the applicable statutory requirements, a banking account, which account shall be accredited with all moneys placed at the disposal of such Commission by any of the Parties or received from any source whatsoever.

Article 10 - Cost Related Payments

(1) South Africa shall, by way of cost related payments to the Lesotho Highlands Development Authority and to the Trans-Caledon Tunnel Authority, be responsible for all costs referred to in paragraph (3), incurred for the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa.

(2) Lesotho shall, by way of cost related payments to the Lesotho Highlands Development Authority and to the Trans-Caledon Tunnel Authority, be responsible for all costs referred to in paragraph (3), incurred for the implementation, operation and maintenance of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho and for the developments envisaged by the provisions of paragraph (2) of Article 4 in the Kingdom of Lesotho.

(3) For the purposes of this Article costs shall comprise all costs wholly and reasonably incurred subsequent to the entry into force of this Treaty, relating to:

(a) the implementation of the Project including all costs of investigations, surveys, feasibility studies, engineering studies, preparation of designs, construction, construction supervision, procurement and commissioning;

(b) the operation, maintenance, and other recurring costs of the Project, including replacement of equipment;

(c) the establishment, administration and operation of the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority including the appointment of consultants as well as Project related staff training programmes for employees of such Authorities, necessary for the functioning of such Authorities;

(d) measures necessary for catchment conservation as well as the prevention of pollution, resulting from the implementation, operation and maintenance of the Project;

(e) the taking out of insurance as provided for in paragraph (31) of Article 7 and paragraph (19) of Article 8;

(f) annual audits as provided for in paragraph (26) of Article 7 and paragraph (14) of Article 8;

(g) land or any interest in land acquired for the purpose of the implementation, operation and maintenance of the Project: Provided that in the case of that part of the Project to be executed in the Republic of South Africa such land shall be held under freehold or ninety-nine year leasehold title, and in the case of that part of the Project to be executed in the Kingdom of Lesotho, such land shall be held under ninety year leasehold title, licence or registrable title;

(h) the measures in order to ensure that members of local communities in the Kingdom of Lesotho affected by Project related causes shall be enabled to maintain a standard of living not inferior to that obtaining at the time of first disturbance as well as compensation for loss to such members as a result of such causes not met by such measures; and

(i) interest payments, financing and foreign exchange forward cover charges on loans, credit facilities or other borrowings as well as all other charges relating to the securing of financing,. obtained by the Lesotho Highland Development Authority, or the Trans-Caledon Tunnel Authority, for the implementation, operation and maintenance of the Project.

Provided that any allowance for a return on or depreciation of any asset the cost of which is partly or wholly met by way of cost related payments as well as any dues, taxes, or charges other than dues, taxes or charges payable into the common revenue pool of the Customs Union, payable in the territory of either Party in respect of services, goods, materials, plant, equipment and related items required for the implementation, operation and maintenance of the Project or any phase thereof, shall not constitute such costs.

(4) Cost related payments in respect of each item of costs referred to in paragraph (3) shall become due relative to the date on which payment of such cost item by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority respectively becomes due: Provided that a Party may elect and shall be allowed by the respective Authority to pay moneys due by such Party as cost related payments directly to contractors and consultants engaged in the implementation, operation and maintenance of that part of the Project in respect of which such payments shall be due and provided further that in the event of loans, credit facilities or other borrowings being procured by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority respectively in accordance with the provisions of paragraph (1) of Article 11, cost related payments in respect of costs financed by way of such

loans, credit facilities or other borrowings shall become due at the time and to the extent to which such loans, utilized credit facilities or other borrowings become redeemable.

(5) All moneys due by each Party as cost related payments, shall be paid to the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority as the case may be, at times and in amounts identified as income derived from cost related payments due by that Party, in the updated detailed cash flow forecasts compiled by such Authorities in accordance with the provisions of paragraph (25) of Article 7 and paragraph (13) of Article 8 respectively.

(6) The accounting and costing systems referred to in paragraph (19) of Article 7 and paragraph (7) of Article 8 shall provide for cost centres as well as associated accounting and costing procedures in order to ensure:

(a) the separate identification of capital and operating expenditure;

(b) the allocation of all costs to specific activities, functions or segments of the Project; and

(c) the allocation of costs attributable to the delivery of water to South Africa and costs attributable to the generation of hydro-electric power in the Kingdom of Lesotho or for the developments envisaged by the provisions of paragraph (2) of Article 4.

(7) The methodology of apportioning the liability between the Parties for the costs of Phase 1A Project Works shall be agreed to by the Parties by way of Protocol III to this Treaty.

(8) The payments made under the provisions of this Article shall not be taken to confer any rights of ownership or equity.

Article 11 - Financing Arrangements

(1) The Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority shall have the obligation to raise money from time to time by way of loans, credit facilities or other borrowings, in such amounts as may be required for the implementation, operation and maintenance of the Project or any phase thereof or which may otherwise be required to meet the obligations of such Authority or to perform its functions: Provided that the entering into of any agreement with regard to all loans, credit facilities or other borrowings, relating to water delivery to South Africa shall be subject to the prior consent of South Africa and all loans, credit facilities or other borrowings relating to the generation of hydro-electric power in the Kingdom of Lesotho shall be subject to the prior consent of Lesotho and provided further that any funds, relating to water delivery to South Africa, obtained on concessionary terms or as equity in the form of a capital contribution, shall, for the purpose of this Article and of the cost related payments in terms of Article 10, be deemed to be a loan at the interest rate and redemption terms applicable to loans of the International Bank for Reconstruction and Development at the time such funds are obtained.

(2) The implementation of each successive phase of the Project and any rights or obligations with regard thereto shall, unless the Parties agree otherwise, be conditional on the entering into of funding arrangements by the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority respectively for such implementation on terms and conditions acceptable to each Party as provided for in paragraph (1).

(3) The Parties shall engage their best endeavours to assist in procuring for the purpose of the Project from appropriate sources moneys by way of loans, credit facilities and other borrowings, required for the implementation, operation and maintenance of the Project or moneys which may otherwise be required to meet the obligations and perform the functions of such Authorities.

(4) The Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority respectively shall administer, with *inter alia* full cognisance of foreign exchange risks, all moneys raised by it by way of loans, credit facilities and other borrowings.

(5) Without prejudice to the provisions of paragraph (16) of Article 6, the Parties shall accept the normal obligations imposed by lenders with respect to approvals, monitoring, information and inspection of and access to sites and works, with regard to the Project.

(6) South Africa shall, with respect to all loans, credit facilities or other borrowings procured by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority for the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa, provide such guarantees as the lenders of such loans, credit facilities or other borrowings, may require.

(7) Lesotho shall, with respect to all loans, credit facilities or other borrowings procured by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority for the implementation, operation and maintenance of that part of the Project relating to the generation of hydro-electric power in the Kingdom of Lesotho provide such guarantees as the lenders of such loans, credit facilities or other borrowings, may require.

(8) The Lesotho Highlands Development Authority shall through the Central Bank of Lesotho or authorised dealers in the Kingdom of Lesotho authorised by Lesotho to deal in gold and foreign exchange in terms of the exchange control provisions applicable in the Kingdom of Lesotho, have access to the foreign exchange market in the Republic of South Africa in order to comply with its obligations in terms of this Treaty.

(9) South Africa shall, if so requested by Lesotho, cause the South African Reserve Bank to make available to the Lesotho Highlands Development Authority the foreign exchange required for any transaction with regard to the implementation, operation or maintenance of the Project.

(10) The Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority as the case may be shall, on the request of South Africa:

(a) allow South Africa to pay all moneys due and payable as cost related payments, directly to any creditor from whom any loans, credit facilities or other borrowings are procured by such Authority for the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa;

(b) engage its best endeavours to substitute a second stage loan for any loan procured for the implementation, operation and maintenance of that part of the Project relating to water delivery to South Africa; and

(c) allow South Africa to pay moneys due by it as cost related payments in redemption of any loans, utilized credit facilities or other borrowings procured for the implementation, operation and maintenance of that part of the Project relating to water delivery to South Africa, at any time prior to the date for the redemption of such loans, utilized credit facilities or other borrowings, subject to the provisions of any financing agreement.

(11) The Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority as the case may be, shall on the request of Lesotho, allow Lesotho to pay all moneys due and payable as cost related payments, directly to any creditor from whom any loans, credit facilities or other borrowings are procured by such Authority for the generation of hydro-electric power or for the developments envisaged by the provisions of paragraph (2) of Article 4, in the Kingdom of Lesotho.

(12) Any loss or gain as a result of foreign exchange fluctuations with regard to transactions engaged in by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority, relating to the implementation, operation and maintenance of that part of the Project pertaining to the delivery of water to South Africa shall, as the case may be, either be borne by or accrue to South Africa.

(13) Any loss or gain as a result of foreign exchange fluctuations, with regard to transactions engaged in by the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority, relating to the generation of hydro-electric power or the developments envisaged by the provisions of paragraph (2) of Article 4, in the Kingdom of Lesotho, shall as the case may be, either be borne by or accrue to Lesotho.

Article 12 - Royalty Payments

(1) Consequent upon the implementation of Sub-phase IA of the Project and in accordance with the provisions of this Article, South Africa undertakes to share with Lesotho, by way of royalty payments, on the basis of fifty-six per cent on the part of Lesotho and forty-four per cent on the part of South Africa, the net benefit computed in accordance with the provisions of paragraph (2) or recomputed in accordance with the provisions of paragraph (6) or (7) or (8) as the case may be.

(2) The net benefit shall be computed in accordance with the procedures set out in the Royalty Manual on the basis of the difference between:

(a) the cost, at its Present Value, of the least cost scheme, identified as the "Optimal Scheme" in the Royalty Manual, which scheme shall comprise either a least cost combination with a combined water delivery capacity of seventy cubic metres per second of a water project solely concerned with the delivery of water, identified as the "Lesotho Highlands Water Project Initial Development" in the Royalty Manual and a subsequent supplementary water project identified as the "Follow-on Orange Vaal Transfer Scheme" in the Royalty Manual, or a water project solely concerned with the delivery of water, identified in the Royalty Manual as the least cost "Lesotho Highlands Water Project Initial Development" with a delivery capacity of seventy cubic metres per second; and

(b) the cost, at its Present Value, of the alternative water project with a delivery capacity of seventy cubic metres per second, identified as the "Least Cost Orange Vaal Transfer Scheme" in the Royalty Manual.

(3) The provisional assessment at the time of the signing of this Treaty of the share of the Parties of the net benefit computed in accordance with the general principles contained in paragraph (2) and determined on the basis of the preliminary reservoir inflow data as shown in the Royalty Manual, expressed in Present Values at January 1995 using December 1985 price levels and a discount rate of six per cent per annum amounts to one thousand two hundred and ninety seven million two hundred and fifty thousand maloti (m 1 297 250 000) on the part of Lesotho and one thousand and nineteen million two hundred and seventy thousand rand (R 1 019 270 000) on the part of South Africa. Such amounts shall be subject to recomputation as provided for in this Article.

(4) In the calendar year preceding the date of first delivery of water to South Africa which shall be January 1995 or at such other stage prior to such year as may be determined by the Joint Permanent Technical Commission, the preliminary reservoir inflow data utilized in the computation of the share of the Parties of the net benefit as provided for in paragraph (3) shall be revised or updated in accordance with the provisions of paragraph (5), retaining the reservoir inflow data format set out in the Royalty Manual and taking account of all relevant hydrological data collected prior to such year. Such revised or updated reservoir inflow data shall be used for the computation of the net benefit as provided for in paragraph (2) and without further revision or updating for the recomputation of the net benefit as provided for in paragraph (6) or (7) or (8) as the case may be.

(5) The revised or updated reservoir inflow data provided for in paragraph (4) shall be determined by the Lesotho Highlands Development Authority in consultation with representatives of the hydrology division of the appropriate Department or Ministry of each of the Parties and shall require the approval of the Joint Permanent Technical Commission in order to take effect. In the event of the Joint Permanent Technical

Commission not approving of such revision or updating as a result of a disagreement on this issue between the respective delegations, such issue shall be referred to an expert consultant in the field of hydrology, appointed by the Parties. Should the Parties fail to agree on the appointment of such consultant within sixty calendar days of a request by either Party to make such appointment, then at the request of either Party, the President of the International Commission on Large Dams (ICOLD) shall appoint such consultant. The findings and decisions of such consultant shall be final and binding on the Parties.

(6) In the event of adjustments to the minimum annual quantities of water specified for each year in Annexure II in accordance with the provisions of paragraph (2) of Article 7, the net benefit shall be recomputed on the basis provided for in paragraph (2) taking account of such adjustments. In accordance with the procedures set out in the Royalty Manual.

(7) In the event of the remaining part of the Project being cancelled at a phase subsequent to Phase I in circumstances other than those provided for in paragraph (8) the net benefit shall be recomputed in accordance with the procedures set out in the Royalty Manual on the basis of the difference between:

(a) the cost, at its Present Value, of the least cost combination with a combined water delivery capacity of seventy cubic metres per second, of a water project solely concerned with the delivery of water identified as the "Lesotho Highlands Water Project Initial Development" in the Royalty Manual with a delivery capacity equal to the combined delivery capacity of those phases of the Project, implemented and those agreed by the Parties to be implemented, at that stage, and a subsequent supplementary water project identified as the "Follow-on Orange Vaal Transfer Scheme" in the Royalty Manual: Provided that in the event of the combined delivery capacity of those phases of the Project implemented and those agreed by the Parties to be implemented at that stage, exceeding the delivery capacity of the "Lesotho Highlands Water Project Initial Development" forming part of the scheme identified as the "Optimal Scheme" in the Royalty Manual, the cost of the latter shall apply in respect of such recomputation; and

(b) the cost, at its Present Value, of the alternative water project with a delivery capacity of seventy cubic metres per second, identified as the "Least Cost Orange Vaal Transfer Scheme" in the Royalty Manual.

(8) In the event of the remaining part of the Project being cancelled at a phase subsequent to Phase I on the insistence, unilaterally, of South Africa, the net benefit shall be recomputed in accordance with the procedures set out in the Royalty Manual on the basis of the difference between:

(a) the cost, at its Present Value, of a water project solely concerned with the delivery of water and identified as the "Lesotho Highlands Water Project Initial Development" in the Royalty Manual with a delivery capacity equal to the combined delivery capacity

of those phases of the Project., implemented, and those agreed to by the Parties to be implemented, at that stage; and

(b) the cost, at its Present Value, of an alternative water project identified as the "Comparable Orange Vaal Transfer Scheme" in the Royalty Manual with a delivery capacity equal to the combined delivery capacity of those phases of the Project referred to in sub-paragraph (a).

(9) The net benefit computed or recomputed in accordance with the provisions of either paragraph (2) or (6) or (7) or (8) as the case may be, shall comprise:

(a) an investment element representing the investment costs difference;

(b) an operation element representing the electricity costs difference attributable to pumping operations; and

(c) an operation and maintenance element representing the remaining operation and maintenance costs difference.

(10) The share of Lesotho of the net benefit shall, subject to the provisions of paragraph (11), be due to Lesotho in the form of a royalty comprising:

(a) a fixed component relating to the investment element of the net benefit in the form of a monthly amount which shall be derived in accordance with the provisions of paragraph (12) and which shall accrue in accordance with the provisions of paragraph (15);

(b) a variable component relating to the operation element of the net benefit representing the difference in electricity costs attributable to pumping operations, in the form of a monthly amount which amount shall be derived by applying the unit rate computed in accordance with the provisions of paragraph (13) and which shall accrue in accordance with the provisions of paragraph (16); and

(c) a variable component relating to the operation and maintenance element of the net benefit representing the difference in the remaining operation and maintenance costs, in the form of a monthly amount which amount shall be derived by applying the unit rate computed in accordance with the provisions of paragraph (14) and which shall accrue in accordance with the provisions of paragraph (16).

(11) Revenue accruing to Lesotho as a direct result of the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa by way of its share of the common revenue pool of the Customs Union shall be deemed to amount to an advance payment by South Africa in respect of the share of Lesotho of the investment element of the net benefit. Such advance payment shall, in accordance with the procedures set out in the Royalty Manual, be computed as a fixed percentage amounting to ten comma six nine (10.69) per cent of the Present Value of the total cost of the "Lesotho Highlands Water Project Initial Development", for the computation or recomputation of the net benefit in accordance with the provisions of either paragraph (2) or (6) or (7) or (8) as the case may be. Such advance payment

shall be set off against the share of Lesotho of the investment element of the net benefit prior to the computation of the fixed component of the royalty:

Provided that in the event of any change to the Customs Union Agreement affecting the share of Lesotho of the common customs revenue pool of the Customs Union such fixed percentage shall be adjusted *mutatis mutandis* in accordance with the procedures set out in the SACU Study using the same project cost data contained therein and provided further that in the event of termination of the Customs Union Agreement the Parties shall agree on an amount to be set off against the share of Lesotho of the investment element of the net benefit equivalent to any revenue accruing to Lesotho as a result of any substitute dues, taxes or charges and provided further that in the event of the provisions of sub-paragraph (a) of paragraph (19) becoming applicable, either Party may request that it be compensated on the grounds that such advance payment no longer adequately represents the revenue accruing to Lesotho as a direct result of the implementation, operation and maintenance of that part of the Project relating to the delivery of water to South Africa, by way of its share of the common revenue pool of the Customs Union which compensation shall be determined by agreement between the Parties and in accordance with the principles established in the SACU Study.

(12) The Present Value of the share of Lesotho of the investment element of the net benefit computed in accordance with the provisions of paragraph (2), having made due allowance in accordance with the provisions of paragraph (11) for the revenue accruing to Lesotho by way of its share of the common revenue pool of the Customs Union, shall be equal to the aggregate of the Present Values of a uniform monthly amount when discounted at a discount rate of six per cent per annum from the Due Date applicable to each such monthly amount for a period of fifty years from January 1995, in accordance with the procedures set out in the Royalty Manual, which monthly amount shall constitute the fixed component of the royalty as provided for in paragraph (15): Provided that in the event of recomputation of the net benefit in accordance with the provisions of paragraph (6) or (7) or (8) as the case may be, the recomputed monthly amount shall be that which when paid uniformly for the balance of the period of fifty years from January 1995 after the date on which the recomputed monthly amount becomes effective together with the monthly amount or amounts paid up to such date shall have in the aggregate a Present Value equal to that of the share of Lesotho of the investment element of the recomputed net benefit, having made due allowance in accordance with the provisions of paragraph (11) for the revenue accruing to Lesotho by way of its share of the common revenue pool of the Customs Union.

(13) The Present Value of the share of Lesotho of the operation element of the net benefit representing the difference in electricity costs attributable to pumping operations computed in accordance with the provisions of paragraph (2) shall be equal to the aggregate of the Present Values of the monthly amounts computed as the products of a constant unit rate in cents per cubic metre of water and the monthly

average of the annual minimum quantity of water specified for each year in Annexure II, having made due allowance for shortfalls in such minimum quantities derived in the computation of the net benefit, when discounted at a discount rate of six percent per annum from the Due Date applicable to each such amount for a period of fifty years from January 1995 in accordance with the procedures set out in the Royalty Manual. Such unit rate shall form the basis for the computation of the variable component of the royalty in respect of the operation element representing the difference in electricity costs relating to pumping operations as provided for in paragraph (16): Provided that in the event of recomputation of the net benefit in accordance with the provisions of paragraph (6) or (7) or (8) as the case may be, the monthly amounts derived as the products of a recomputed constant unit rate in cents per cubic metre of water and the monthly average of the annual minimum quantity of water specified in Annexure II for each year from the date such recomputed unit rate becomes effective, when paid monthly for the balance of the period of fifty years from January 1995 after such date together with the monthly amounts paid up to such date, shall have in the aggregate a Present Value equal to the share of Lesotho of the operation element of the recomputed net benefit representing the difference in electricity costs attributable to pumping operations.

(14) The Present Value of the share of Lesotho of the operation and maintenance element of the net benefit representing the difference in the remaining operation and maintenance costs computed in accordance with the provisions of paragraph (2) shall be equal to the aggregate of the Present Values of the monthly amounts computed as the products of a constant unit rate in cents per cubic metre of water and the monthly average of the annual minimum quantity of water specified for each year in Annexure II, having made due allowance for shortfalls in such minimum quantities derived in the computation of the net benefit, when discounted at a discount rate of six percent per annum from the Due Date applicable to each such amount for a period of fifty years from January 1995 in accordance with the procedures set out in the Royalty Manual. Such unit rate shall form the basis for the computation of the variable component of the royalty in respect of the operation element representing the difference in the remaining operation and maintenance costs as provided for in paragraph (16): Provided that in the event of recomputation of the net benefit in accordance with the provisions of paragraph (6) or (7) or (8) as the case may be, the monthly amounts derived as the products of a recomputed constant unit rate in cents per cubic metre of water and the monthly average of the annual minimum quantity of water specified in Annexure II for each year from the date such recomputed unit rate becomes effective, when paid monthly for the balance of the period of fifty years from January 1995 after such date together with the monthly amounts paid up to such date, shall have in the aggregate a Present Value equal to the share of Lesotho of the operation and maintenance element of the recomputed net benefit representing the difference in the remaining operation and maintenance costs.

(15) Subject to the provisions of paragraph (19) the monthly amount computed in accordance with the provisions of paragraph (12) shall accrue monthly as the fixed

component of the royalty for a period of fifty years relative to the month of the first delivery of water to South Africa which shall be January 1995.

(16) Both variable components of the royalty shall accrue monthly for a period of fifty years relative to the month of the first delivery of water to South Africa which shall be January 1995, and such monthly amounts shall be determined as the products of the unit rates computed in accordance with the provisions of paragraphs (13) and (14) and the quantity of water actually delivered to South Africa during each month not in excess of the Scheduled Monthly Demand and the quantity of water in excess of such Scheduled Monthly Demand utilized to recoup any shortfall in the Scheduled Monthly Demand for any previous month during such year or utilized during the first six months of any year to recoup any shortfall in the delivery of the minimum quantity specified for the previous year in Annexure II.

(17) South Africa shall be liable to pay to Lesotho royalties in respect of any quantity of water actually delivered to South Africa, in excess of the Scheduled Monthly Demand in any month during any one calendar year, which has not been utilized as provided for in paragraph (16) to recoup any previous shortfalls and which is utilized to recoup a shortfall in any subsequent month during the same calendar year. Such royalties shall be the product of the quantity of water utilized to effect such recoupment and a unit rate equal to the difference between the sum of the unit rates referred to in paragraphs (13) and (14) applicable at the time of such shortfall and the sum of the unit rates referred to in paragraph (1) of Article 13 applicable at the time such quantity of water is delivered.

(18) The unit rates computed in accordance with the provisions of paragraphs (13) and (14) and applicable at the termination of the period of fifty years on 31 December 2044 shall continue to apply subsequent to such period and subsequent to such date South Africa shall be liable to pay monthly to Lesotho amounts computed as:

(a) the products of the unit rates and the quantity of water actually delivered to South Africa during each month not in excess of the Scheduled Monthly Demand and the quantity of water in excess of such Scheduled Monthly Demand, utilized to recoup any shortfall in the Scheduled Monthly Demand for any previous month during such year or utilized during the first six months of any year to recoup any shortfall in the delivery of the minimum annual quantity specified for the previous year in Annexure II; and

(b) the product of the quantity of water actually delivered to South Africa in excess of the Scheduled Monthly Demand in any month during any one calendar year which has not been utilized to recoup any previous shortfall as provided for in sub-paragraph (a) and which is utilized to recoup a shortfall in any subsequent month in the same calendar year and a unit rate equal to the difference between the sum of the unit rates referred to in paragraphs (13) and (14) applicable at the time of such shortfall and the sum of the unit rates referred to in paragraph (1) of Article 13 applicable at the time such quantity of water is delivered.

All such amounts shall be adjusted *mutatis mutandis* in accordance with the provisions of paragraph (20).

(19) In the event of the Scheduled Monthly Demand for any month not being delivered to South Africa, the fixed component of the royalty due shall, in accordance with the procedures set out in the Royalty Manual, be reduced in proportion to such shortfall provided that such shortfall results from:

(a) the commencement of reliable supplies from any phase of the Project being delayed relative to the time when such supplies shall be required to satisfy the minimum deliveries to South Africa specified for any year in Annexure II: Provided that South Africa shall not be exempt from its obligation to pay such fixed component in the event of such delay occurring as the result of any act or omission on the part of the Trans-Caledon Tunnel Authority in respect of that part of the Project for which such Authority shall be wholly responsible; and

(b) any of the contingencies referred to in paragraph (2) of Article 1 occurring: Provided that in the event of a contingency referred to in sub-paragraph (a) of paragraph (2) of Article 14 occurring, South Africa shall continue to pay to Lesotho the fixed component only of the royalty.

Provided that such reduction shall be reimbursed in proportion to the extent that such shortfall is recouped by deliveries in excess of the Scheduled Monthly Demand in subsequent months during that calendar year or during the first six months following the end of such year.

(20) The fixed and variable components of the royalty shall be adjusted as provided for in this paragraph and as more fully set out in the Royalty Manual:

(a) the fixed component of the royalty as well as the variable component of the royalty relating to the remaining operation and maintenance element of the net benefit shall be indexed to the Production Price Index interpolated to the actual date of payment;

(b) the variable component of the royalty relating to the electricity element of the net benefit shall be indexed to the Average Annual Electricity Price interpolated to the actual date of payment.

(21) The Due Date for payment of:

(a) amounts in terms of paragraph (15) shall be the date at the end of each month for the fifty year period commencing in January 1995. Provided that in the event of a delay in the commencement of reliable supplies from Phase IA in accordance with the provisions of sub-paragraph (a) of paragraph (19), the Due Date for each of the monthly amounts from January 1995 up to and including the month before that in which such supplies commence shall be the date at the end of that month in which such supplies commence;

(b) amounts in terms of paragraph (16) shall be the date at the end of the month during which the relevant quantity of water is actually delivered;

(c) amounts in terms of paragraph (17) shall be the date at the end of the month in which the shortfall which is recouped occurs;

(d) amounts in terms of sub-paragraph (a) of paragraph (18) shall be the date at the end of the month during which the relevant quantity of water is actually delivered;

(e) amounts in terms of sub-paragraph (b) of paragraph (18) shall be the date at the end of the month in which the shortfall which is recouped occurs.

(22) Prior to the implementation of Phase IA of the Project, an invoicing procedure in respect of royalty payments and payments in terms of paragraph (18) shall be established by agreement between the Parties and in accordance with such procedure the Lesotho Highlands Development Authority shall, not later than five calendar days following the end of each month, on behalf of Lesotho, present to South Africa an invoice in respect of the royalty payments or payments in terms of paragraph (18) for the preceding month and such invoices shall incorporate adjustments to earlier invoiced amounts in accordance with the provisions of this Article.

(23) South Africa shall settle invoices presented by the Lesotho Highlands Development Authority within thirty calendar days from the date of receipt of such invoices.

(24) Royalty amounts due or amounts due in terms of paragraph (18) shall attract interest at a rate of six per cent per annum for the period between the Due Date and the actual date of payment of such amounts: Provided that South Africa shall compensate Lesotho for any reasonable loss incurred by Lesotho as a result of such royalty payments being received later than thirty calendar days from the date of receipt of such invoice.

(25) Any dispute in respect of royalty payments and payments in terms of paragraph (18) as invoiced by the Lesotho Highlands Development Authority shall be settled by the Joint Permanent Technical Commission: Provided that until the settlement of such dispute. South Africa shall make payment for the month in dispute on the basis of the best possible estimate by the Joint Permanent Technical Commission of royalties due for such period. Adjustments to royalty payments as a result of the settlement of such dispute shall be reflected in subsequent invoices.

(26) All royalty payments and payments in terms of paragraph (18) shall be deposited in a special account designated by Lesotho at the Central Bank of Lesotho.

(27) South Africa shall cause the South African Reserve Bank to make available to Lesotho through the Central Bank of Lesotho freely convertible foreign exchange at its most favourable exchange rate for any foreign transactions that Lesotho authorizes from the proceeds of royalty payments and payments in terms of paragraph (18).

Article 13 - Payments with Regard to Excess Water, Downstream Releases and Water Abstractions

(1) South Africa shall be liable to pay each month to Lesotho in respect of water delivered in terms of paragraphs (3), (6) and (7) of Article 7 in excess of the Scheduled Monthly Demand for such month, less any portion of such excess utilized to recoup any shortfall in the Scheduled Monthly Demand for any previous month during the same year and if the relevant month be one of the first six months of any calendar year, less any portion of such excess utilized to recoup any shortfall in the delivery of the minimum quantity specified for the previous year in Annexure II (which difference is hereinafter referred to as "Excess Water"), an amount equal to the sum of:

(a) an amount computed as the product of a unit rate equal to fifty per cent of the unit rate referred to in paragraph (13) of Article 12, and the quantity of Excess Water actually delivered to South Africa during any such month; and

(b) an amount computed as the product of a unit rate equal to fifty per cent of the unit rate referred to in paragraph (14) of Article 12, and the quantity of Excess Water actually delivered to South Africa during any such month.

(2) The Due Date for payment of each amount computed in accordance with the provisions of paragraph (1) shall be the date at the end of the month during which the relevant quantity of water is actually delivered.

(3) Any amount computed in accordance with the provisions of sub-paragraph (a) of paragraph (1), shall, as set out in the Royalty Manual, be indexed to the Average Annual Electricity Price interpolated to the actual date of payment.

(4) Any amount computed in accordance with the provisions of sub-paragraph (b) of paragraph (1), shall, as set out in the Royalty Manual, be indexed to the Production Price Index interpolated to the actual date of payment.

(5) Not later than five calendar days following the end of each month, the Lesotho Highlands Development Authority shall, on behalf of Lesotho present South Africa an invoice for the amounts due in respect of Excess Water delivered during the preceding month. The provisions of paragraphs (22), (23), (24) and (25) of Article 12 shall apply *mutatis mutandis* with regard to such invoice procedures and invoices.

(6) In the event of downstream releases at the request of Lesotho in accordance with the provisions of paragraph (13) of Article 7 as well as water abstractions in accordance with the provisions of paragraph (14) of Article 7 such releases and abstractions shall be subject to compensation payments by Lesotho to South Africa as agreed to by the Parties from time to time. Such agreement shall further provide for the time and manner of payment of any amounts due.

(7) In the event of downstream releases at the request of South Africa in accordance with paragraph (13) of Article 7, South Africa shall compensate Lesotho:

(a) for any loss the Parties agree results from the effect of such release on the operation of the hydro-electric complex forming part of the Project. The Parties shall further agree with regard to the time and manner of payment of any amounts due; and

(b) for any loss in royalties or reduction in payments in terms of the provisions of paragraph (1) or paragraph (18) of Article 12 as a result of water so released not being delivered to South Africa at the Designated Delivery Point. Within thirty days of such release the Lesotho Highlands Development Authority shall, on behalf of Lesotho, present to South Africa an invoice in respect of amounts due as a result of such loss. The provisions of paragraphs (22), (23), (24) and (25) of Article 12 shall apply *mutatis mutandis* with regard to such invoice procedures and invoices.

(8) All payments in accordance with the provisions of paragraph (1) and sub-paragraph (b) of paragraph (7) shall be effected for the credit of Lesotho in the special account at the Central Bank of Lesotho referred to in paragraph (26) of Article 12.

(9) South Africa shall cause the South African Reserve Bank to make available to Lesotho through the Central Bank of Lesotho freely convertible foreign exchange at its most favourable exchange rate for any foreign transactions that Lesotho authorizes from the proceeds of payments to Lesotho in terms of the provisions of this Article.

Article 14 - Procedure in Cases *of Force Majeure*

(1) In case of any substantial impairment of the implementation of this Treaty caused by *force majeure* as defined in paragraph (2), the Parties shall take the necessary measures of palliation and restoration on the basis of consultation and in a spirit of co-operation, in so far as the immediate circumstances of emergency so permit, and shall subsequently agree on joint action.

(2) For the purpose of this Article, *"force majeure"* includes the following:

(a) any disturbance due to an extreme hydrological or other natural event, including extreme drought, and affecting the delivery of water to South Africa;

(b) the use of force by the states;

(c) armed insurrection and other forms of civil strife; and

(d) episodes of sabotage in so far as these do not form part of the contingencies referred to in sub-paragraphs (b) and (c) of this paragraph.

(3) The provisions of this Article are without prejudice to the application of the principles of international law relating to treaties.

Article 15 - Social and Environmental Considerations

The Parties agree to take all reasonable measures to ensure that the implementation operation and maintenance of the Project are compatible with the protection of the existing quality of the environment and, in particular, shall pay due regard to the maintenance of the welfare of persons and communities immediately affected by the Project.

Article 16: The Prevention and Settlement of Disputes

(1) For the purpose of this Article "dispute" shall mean any dispute concerning the interpretation and application of this Treaty.

(2) Lesotho, South Africa, the Lesotho Highlands Development Authority, the Trans-Caledon Tunnel Authority, and the Joint Permanent Technical Commission shall pay due regard to the overriding consideration that any dispute shall be resolved in a spirit of conciliation and that any impairment of the implementation, operation and maintenance of the Project shall be avoided.

(3) The Chief Executive of the Lesotho Highlands Development Authority and the Chief Executive of the Trans-Caledon Tunnel Authority shall have the power to institute, each within his own sphere of responsibility and after prior notification of the Joint Permanent Technical Commission, the minimum action required to safeguard the safety and integrity of the Project during the period in which the dispute procedure provided for in this Article is in operation.

(4) In the event of a dispute arising, either Party or the Parties jointly or the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority, may request the Joint Permanent Technical Commission to conduct an investigation and to present a written report containing its recommendations to both Parties, the Lesotho Highlands Development Authority and the Trans-Caledon Tunnel Authority.

(5) The Joint Permanent Technical Commission shall conduct the investigation and present its written report in terms of paragraph (4) with all reasonable dispatch. If the Joint Permanent Technical Commission cannot consider the matter within fourteen calendar days, it shall notify the referring party and, where appropriate, request an extension of time for consideration of the matter.

(6) The Joint Permanent Technical Commission may either report that no actions called for or may make recommendations calling for measures to be taken by one of the Parties, the Parties jointly, the Lesotho Highlands Development Authority or the Trans-Caledon Tunnel Authority, or may report that the matter is of such a nature that recourse to more formal procedures is called for.

(7) In the event of a dispute not being resolved by means of any action taken in accordance with the provisions of paragraphs (4), (5) and (6), it shall be made the subject of negotiation between the Parties.

(8) If a dispute cannot be resolved by negotiation between the Parties, such dispute shall be submitted to the Arbitral Tribunal as hereinafter provided.

(9) The Parties may jointly institute arbitration proceedings on the basis of an agreement to that effect between them which agreement shall set forth the nature of the dispute and the names of the arbitrators appointed by each Party.

Provided that any Party may institute arbitration proceedings by giving written notice thereof to the other Party which notice shall set forth the nature of the dispute and the name of the arbitrator appointed by such Party.

(10) The Arbitral Tribunal shall consist of three arbitrators who shall be legally qualified persons and such Tribunal shall be constituted in each instance as follows:

(a) Each Party shall appoint one arbitrator and the third arbitrator, who shall be the President of such Tribunal, shall be appointed by agreement between the two arbitrators appointed by the Parties;

(b) Should the arbitrators appointed by the Parties fail to agree on the appointment of the President of the Tribunal within sixty calendar days of the agreement or notice, as the case may be, referred to in paragraph (9), the President of the International Commission on Large Dams (ICOLD) shall, at the request of either Party, appoint a person as President of such Tribunal, who shall not be a citizen or former citizen of the Kingdom of Lesotho or the Republic of South Africa or a resident or former resident in the territory of any Party;

(c) Should the Party notified of the initiation of arbitration proceedings as provided for in paragraph (9), fail to appoint its arbitrator within sixty calendar days of such notification, such arbitrator shall at the request of the Party instituting such proceedings, be appointed by the President of such Tribunal which President shall be appointed *mutatis mutandis* by the President of the International Commission on Large Dams (ICOLD) in accordance with the provisions of sub-paragraph (b) at the request of the Party initiating such arbitration proceedings.

(11) Any arbitrator may resign by submitting his resignation in writing to both Parties and any arbitrator may at any time be removed from office by agreement between the Parties.

(12) In the event of death, resignation or removal of an arbitrator for whose appointment a Party is responsible, such Party shall appoint a replacement within sixty calendar days from the date of death, resignation or removal. Should such Party fail to make such appointment within such period, the President of the Arbitral Tribunal shall appoint an arbitrator in his stead. In the event of death, resignation or removal of the President of such Tribunal a replacement shall be nominated by agreement between the remaining arbitrators, within a period of sixty calendar days of such death, resignation or removal. Should the remaining arbitrators fail to agree on the appointment of the President, such appointment shall be made *mutatis mutandis* in accordance with the provisions of sub-paragraph (b) of paragraph (10).

(13) Notwithstanding anything to the contrary contained in this Article, the Parties may at any time agree to refer a dispute to arbitration.

(14)

(a) The Arbitral Tribunal shall convene at a time and venue to be determined by the President and such Tribunal shall thereafter determine the time and venue of any further sessions;

(b) Subject to the provisions of this Article, the Arbitral Tribunal shall establish its rules of procedure and shall decide all questions relating to its competence, jurisdiction and procedure;

(c) The official language of the Arbitral Tribunal shall be English;

(d) The Arbitral Tribunal may appoint such personnel, including a Registrar, as it may deem necessary for the proper execution of its functions in terms of this Article;

(e) All decisions of the Arbitral Tribunal shall be by a majority vote of the members but in the event of there being no majority vote, the President shall have a casting vote in addition to a deliberative vote;

(f) The Arbitral Tribunal shall afford both Parties a fair hearing and may render an award by default;

(g) The proceedings and deliberations of the Arbitral Tribunal shall take place in private and all documents relating thereto as well as the award of such Tribunal shall remain secret, unless the Parties otherwise agree;

(15)

(a) The award of the Arbitral Tribunal shall be in writing and signed by the members who voted for it and shall constitute the award of the Tribunal, and a signed counterpart of such award shall be transmitted to each Party;

(b) The award of the Arbitral Tribunal shall be definitive and binding on the Parties, and they shall duly and expeditiously give effect thereto;

(c) During a period of thirty calendar days after the award has been communicated to the Parties the Arbitral Tribunal may, either of its own accord or at the request of either Party, rectify any clerical, typographical or arithmetical error in the award, or any obvious error of similar nature and shall forthwith communicate any such rectification to both Parties;

(d) Any dispute between the Parties as to the meaning and scope of the award shall, at the request of either Party and within sixty calendar days of the rendering of the award, be referred for decision to the Arbitral Tribunal which rendered the award.

(16)

(a) Without prejudice to the provisions of sub-paragraph (b) each Party shall be responsible for the remuneration of the arbitrator appointed by such Party, all other costs connected with such appointment and the costs entailed by the preparation of its own case. The remuneration of an arbitrator appointed by the President of the Arbitral Tribunal as provided for in sub-paragraph (c) of paragraph (10) or paragraph (12), as the case may be, as well as all other costs connected with such appointment shall be borne by the Party failing to effect such appointment. The remuneration of the President of such Tribunal, any personnel appointed by such Tribunal and all general

expenses incurred as a result of the arbitration process, shall be borne equally by the Parties;

(b) In the case of a unilateral application to the Arbitral Tribunal, instituted by way of notice as provided for in paragraph (9), such Tribunal may, with regard to the remuneration of the President of the Tribunal and all other general expenses in respect of such arbitration process, make such order as to cost as it may deem equitable;

(c) The Parties shall within fourteen calendar days after receiving notice from the Arbitral Tribunal to that effect, deposit in the manner prescribed in such notice equal amounts specified in the notice in order to meet the estimated expenses with regard to the remuneration of the President of such Tribunal and personnel appointed by such Tribunal as well as all other general expenses in respect of the arbitration proceedings.

(17) Except as the Parties may otherwise agree the law to be applied by the Arbitral Tribunal shall be this Treaty and, whenever necessary for its interpretation or application, but only to the extent necessary for that purpose, the following in the order in which they are listed:

(a) international agreements entered into by both Parties;

(b) customary international law universally recognized or having receive the assent of both Parties;

(c) Roman Dutch customary law; and

(d) all such other rules of law in force in both the Kingdom of Lesotho and the Republic of South Africa.

(18) At the conclusion of any arbitration proceedings, the President of the Arbitral Tribunal shall hand all records and documents relating thereto, to the Secretary of the Joint Permanent Technical Commission for safekeeping.

Article 17 - Savings Clauses

(1) The provisions of this Treaty are without prejudice to the views of each Party relating to the delimitation and demarcation of its international boundary.

(2) The provisions of this Treaty are without prejudice to the rights under public international law of riparians of the Senqu/Orange River other than the Kingdom of Lesotho and the Republic of South Africa.

(3) This Treaty is concluded without prejudice to all existing bilateral and multilateral agreements presently in operation between the two Parties, including the Customs Union Agreement, the Trilateral Monetary Agreement between the Governments of Lesotho, Swaziland, and South Africa of 18 April 1986, and the Bilateral Monetary Agreement between the Governments of Lesotho and South Africa of 18 April 1986.

(4) South Africa shall cause ESCOM or its successors, to supply electricity to the Kingdom of Lesotho on such terms as are being or will be granted to any other

comparable bulk consumer with its own generating capacity in the Republic of South Africa.

Article 18 - Procedure For Review And Revision

(1) The provisions of this Treaty shall be reviewed at intervals of twelve years, calculated from the date of signature hereof or at such other intervals as the Parties may agree upon.

(2) Notwithstanding the foregoing, this Treaty may be amended at any time by agreement of bath Parties.

...

Annexure I - Project description. - Omitted
Annexure II - Minimum quantities for water delivery. - Omitted
Annexure III - Privileges and immunities. - Omitted

Annexure B

Revised Protocol on Shared Watercourses in the Southern African Development Community (SADC)

PREAMBLE

We, the Heads of State or Government of:

The Republic of Angola

The Republic of Botswana

The Democratic Republic of the Congo

The Kingdom of Lesotho

The Republic of Malawi

The Republic of Mauritius

The Republic of Mozambique

The Republic of Namibia

The Republic of Seychelles

The Republic of South Africa

The Kingdom of Swaziland

The United Republic of Tanzania

The Republic of Zambia

The Republic of Zimbabwe

BEARING in mind the progress with the development and codification of international water law initiated by the Helsinki Rules and that the United Nations subsequently adopted the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses;

RECOGNISING the relevant provisions of Agenda 21 of the United Nations Conference on Environment and Development, the concepts of environmentally sound management, sustainable development and equitable utilisation of shared watercourses in the SADC Region;

CONSIDERING the existing and emerging socio-economic development programmes in the SADC Region and their impact on the environment;

DESIROUS of developing close co-operation for judicious, sustainable and co-ordinated utilisation of the resources of the shared watercourses in the SADC Region;

CONVINCED of the need for co-ordinated and environmentally sound development of the resources of shared watercourses in the SADC Region in order to support sustainable socioeconomic development;

RECOGNISING that there are as yet no regional conventions regulating common utilisation and management of the resources of shared watercourses in the SADC Region;

MINDFUL of the existence of other Agreements in the SADC Region regarding the common utilisation of certain watercourses; and

IN ACCORDANCE with Article 22 of the Treaty, have agreed as follows:

Article 1

Definitions

1. For the purposes of this Protocol the following terms shall have the meanings ascribed to them hereunder:

“Agricultural use” means use of water for irrigation purposes;

“Domestic use” means use of water for drinking, washing, cooking, bathing, sanitation and stock watering purposes;

“Emergency situation” means a situation that causes or poses an imminent threat of causing serious harm to Watercourse States and which results suddenly from natural causes, such as torrential rains, floods, landslides or earthquakes or from human conduct;

“Environmental use” means the use of water for the preservation and maintenance of ecosystems;

“Industrial use” means use of water for commercial, electrical power generation, industrial, manufacturing and mining purposes;

“Management of a shared watercourse” means

(i) planning the sustainable development of a shared watercourse and providing for the implementation of any plans adopted; and

(ii) otherwise promoting the rational, equitable and optimal utilisation, protection, and control of the watercourse;

“Navigational use” means use of water for sailing whether it be for transport, fishing, recreation or tourism;

“Pollution of a shared water course” means any detrimental alteration in the composition or quality of the waters of a shared watercourse which results directly or indirectly from human conduct;

“Regulation of the flow of the waters of a shared watercourse” means the use of hydraulic works or any other continuing measure to alter, vary or otherwise control the flow of waters of a shared watercourse;

“Shared watercourse” means a watercourse passing through or forming the border between two or more Watercourse States;

“Significant Harm” means non-trivial harm capable of being established by objective evidence without necessarily rising to the level of being substantial;

“State Party” means a member of SADC that ratifies or accedes to this Protocol;

“Watercourse” means a system of surface and ground waters consisting by virtue of their physical relationship a unitary whole normally flowing into a common terminus such as the sea, lake or aquifer;

“Watercourse State” means a State Party in whose territory part of a watercourse is situated.

2. Any other term defined in the Treaty and used in this Protocol shall have the same meaning as ascribed to it in the Treaty.

Article 2

Objective

The overall objective of this Protocol is to foster closer cooperation for judicious, sustainable and co-ordinated management, protection and utilisation of shared watercourses and advance the SADC agenda of regional integration and poverty alleviation. In order to achieve this objective, this Protocol seeks to:

a) promote and facilitate the establishment of shared watercourse agreements and Shared Watercourse Institutions for the management of shared watercourses;

b) advance the sustainable, equitable and reasonable utilisation of the shared watercourses;

c) promote a co-ordinated and integrated environmentally sound development and management of shared watercourses;

d) promote the harmonisation and monitoring of legislation and policies for planning, development, conservation, protection of shared watercourses, and allocation of the resources thereof; and

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e) promote research and technology development, information exchange, capacity building, and the application of appropriate technologies in shared watercourses management.”

Article 3

General Principles

For the purposes of this Protocol the following general principles shall apply:

1. The State Parties recognise the principle of the unity and coherence of each shared watercourse and in accordance with this principle, undertake to harmonise the water uses in the shared wate rcourses and to ensure that all necessary interventions are consistent with the sustainable development of all Watercourse States and observe the objectives of regional integration and harmonisation of their socio-economic policies and plans.

2. The utilisation of shared watercourses within the SADC Region shall be open to each Watercourse State, in respect of the watercourses within its territory and without prejudice to its sovereign rights, in accordance with the principles contained in this Protocol. The utilisation of the resources of the watercourses shall include agricultural, domestic, industrial, navigational and environmental uses.

3. State Parties undertake to respect the existing rules of customary or general international law relating to the utilisation and management of the resources of shared watercourses.

4. State Parties shall maintain a proper balance between resource development for a higher standard of living for their people and conservation and enhancement of the environment to promote sustainable development.

5. State Parties undertake to pursue and establish close co-operation with regard to the study and execution of all projects likely to have an effect on the regime of the shared watercourse.

6. State Parties shall exchange available information and data regarding the hydrological, hydro geological, water quality, meteorological and environmental condition of shared watercourses.

7. a) Watercourse States shall in their respective territories utilise a shared watercourse in an equitable and reasonable manner. In particular, a shared watercourse shall be used and developed by Watercourse States with a view to attain optimal and sustainable utilisation thereof and benefits therefrom, taking into account the interests of the Watercourse States concerned, consistent with adequate protection of the watercourse for the benefit of current and future generations.

b) Watercourse States shall participate in the use, development and protection of a shared watercourse in an equitable and reasonable manner. Such participation, includes both the right to utilise the watercourse and the duty to co-operate in the protection and development thereof, as provided in this Protocol.

8. a) Utilisation of a shared watercourse in an equitable and reasonable manner within the meaning of Article 7(a) and (b) requires taking into account all relevant factors and circumstances including:

(i) geographical, hydrographical, hydrological, climatical, ecological and other factors of a natural character;

(ii) the social, economic and environmental needs of the Watercourse States concerned;

(iii) the population dependent on the shared watercourse in each Watercourse

State;

(iv) the effects of the use or uses of a shared watercourse in one Watercourse

State on other Watercourse States;

(v) existing and potential uses of the watercourse;

(vi) conservation, protection, development and economy of use of the water resources of the shared watercourse and the costs of measures taken to that effect; and

(vii) the availability of alternatives, of comparable value, to a particular planned or existing use.

(b) The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is an equitable and reasonable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

9. State Parties shall deal with planned measures in conformity with the procedure set out in Article 4 (1).

10 a) State Parties shall, in utilising a shared watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other Watercourse States.

b) Where significant harm is nevertheless caused to another Watercourse State, the

State whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of paragraph (a) above in consultation with the affected States, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

c) Unless the Watercourse States concerned have agreed otherwise for the protection of the interests of persons, natural or juridical, who have suffered or are under a serious threat of suffering significant transboundary harm as a result of activities related to a shared watercourse, a Watercourse State shall not discriminate on the basis of nationality or residence or place where the injury occurred, in granting to such persons, in accordance with its legal system, access to judicial or other procedures,

or a right to claim compensation or other relief in respect of significant harm caused by such activities carried on in its territory.

Article 4

Specific Provisions

1. Planned Measures

a) Information concerning planned measures

State Parties shall exchange information and consult each other and, if necessary, negotiate the possible effects of planned measures on the condition of a shared watercourse.

b) Notification concerning planned measures with possible adverse effects

Before a State Party implements or permits the implementation of planned measures which may have a significant adverse effect upon other Watercourse States, it shall provide those States with timely notification thereof. Such notification shall be accompanied by available technical data and information, including the results of any environmental impact assessment, in order to enable the notified States to evaluate the possible effects of the planned measures.

c) Period for reply to notification

(i) Unless otherwise agreed, a State Party providing a notification under paragraph (b) shall allow the notified States a period of six months within which to study and evaluate the possible effects of the planned measures and to communicate the findings to it;

(ii) This period shall, at the request of a notified State for which the evaluation of the planned measures poses difficulty, be extended for a period of six months.

d) Obligations of the notifying State during the period for reply

During the period referred to in paragraph (c), the notifying State:

i) shall co-operate with the notified States by providing them, on request, with any additional data and information that is available and necessary for an accurate evaluation; and

ii) shall not implement or permit the implementation of the planned measures without the consent of the notified States.

e) Reply to Notification

The notified States shall communicate their findings to the notifying State as early as possible within the period applicable pursuant to paragraph (c). If a notified State finds that implementation of the planned measures would be inconsistent with the provisions of Article 3 (7) or (10), it shall attach to its finding a documented explanation setting the reasons for the findings.

f) Absence of reply to notification

i) If, within the period applicable pursuant to paragraph (c), the notifying State receives no communication under (e), it may, subject to its obligations under Article 3 (7) and (10), proceed with the implementation of the planned measures, in accordance with the notification and any other data and information provided to the notified States.

ii) Any claim to compensation by a notified State which has failed to reply within the period applicable pursuant to paragraph (c) may be offset by the costs incurred by the notifying State for action undertaken after the expiration of the time for a reply which would not have been undertaken if the notified State had objected within that period.

g) Consultations and negotiations concerning planned measures

i) If a communication is made under paragraph (e) that implementation of the planned measures would be inconsistent with the provisions of Article 3 (7) or (10), the notifying State and the State making the communication shall enter into consultations and, if necessary, negotiations with a view to arriving at an equitable resolution of the situation.

ii) The consultations and negotiations shall be conducted on the basis that each State must in good faith pay reasonable regard to the rights and legitimate interests of the other States.

iii) During the course of the consultations and negotiations, the notifying State shall, if so requested by the notified State at the time it makes the communication, refrain from implementing or permitting the implementation of the planned measures for a period of six months unless otherwise agreed.

h) Procedures in the absence of notification

i) If a State Party has reasonable grounds to believe that another Watercourse State is planning measures that may have a significant adverse effect upon it, the former State may request the latter to apply the provisions of paragraph (b). The request shall be accompanied by a documented explanation setting forth its grounds.

ii) If the State planning the measures finds that it is not under an obligation to provide a notification under paragraph (b), it shall so inform the other State, providing a documented explanation setting forth the reasons for such finding. If this finding does not satisfy the other State, the two States shall, at the request of that other State, promptly enter into consultations and negotiations in the manner provided in sub-paragraphs (i) and (ii) of paragraph (g).

iii) During the course of the consultations and negotiations, the State planning the measures shall, if so requested by the other State at the time it requests the initiation of consultations and negotiations, refrain from implementing or permitting the implementation of those measures for a period of six months unless otherwise agreed.

i) Urgent implementation of planned measures

i) In the event that the implementation of planned measures is of the utmost urgency in order to protect public health, public safety or other equally important interests, the State planning the measures may, subject to paragraphs 7 and 10 of Article 3, immediately proceed to implementation, notwithstanding the provisions of paragraph (d) and sub-paragraph (iii) of paragraph (g).

ii) In such case, a formal declaration of the urgency of the measures shall be communicated without delay to the other Watercourse States referred to in paragraph (b) together with the relevant data and information.

(iii) The State planning the measures shall, at the request of any of the States referred to in paragraph (ii), promptly enter into consultations and negotiations with it in the manner indicated in sub-paragraphs (i) and (ii) of paragraph (g).

2. Environmental Protection and Preservation

a) Protection and preservation of ecosystems

State Parties shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of a shared watercourse.

b) Prevention, reduction and control of pollution

i) State Parties shall, individually and, where appropriate, jointly, prevent, reduce and control the pollution and environmental degradation of a shared watercourse that may cause significant harm to other Watercourse States or to their environment, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse.

ii) Watercourse States shall take steps to harmonise their policies and legislation in this connection.

iii) State Parties shall, at the request of any one or more of them, consult with a view to arriving at mutually agreeable measures and methods to prevent, reduce and control pollution of a shared watercourse, such as:

a) setting joint water quality objectives and criteria;

b) establishing techniques and practices to address pollution from point and non-point sources;

c) establishing lists of substances the introduction of which, into the waters of a shared watercourse, is to be prohibited, limited, investigated or monitored.

c) Introduction of alien or new species

State Parties shall take all measures necessary to prevent the introduction of species, alien or new, into a shared watercourse which may have effects detrimental to the ecosystems of the watercourse resulting in significant harm to other Watercourse States.

d) Protection and preservation of the aquatic environment

State Parties shall individually and, where appropriate, in co-operation with other

States, take all measures with respect to a shared watercourse that are necessary to protect and preserve the aquatic environment, including estuaries, taking into account generally accepted international rules and standards.

3. Management of Shared Watercourses

a) Management

Watercourse States shall, at the request of any of them, enter into consultations concerning the management of a shared watercourse, which may include the establishment of a joint management mechanism.

b) Regulation

i) Watercourse States shall co-operate, where appropriate, to respond to needs or opportunities for regulation of the flow of the waters of a shared watercourse.

ii) Unless otherwise agreed, Watercourse States shall participate on an equitable and reasonable basis in the construction and maintenance or defrayal of the costs of such regulation works as they may have agreed to undertake.

c) Installations

i) Watercourse States shall, within their respective territories, employ their best efforts to maintain and protect installations, facilities and other works related to a shared watercourse.

ii) Watercourse States shall, at the request of any of them which has reasonable grounds to believe that it may suffer significant adverse effects, enter into consultations with regards to:

a) the safe operation and maintenance of installations, facilities, or other works related to a shared watercourse; and

b) the protection of installations, facilities or other works from wilful or negligent acts or the forces of nature.

iii) Shared watercourses and related installations, facilities and other works shall enjoy the protection accorded by the principles and rules of international law applicable in international and non-international armed conflict and shall not be used in violation of those principles and rules.

4. Prevention and Mitigation of Harmful Conditions

a) State Parties shall individually and, where appropriate, jointly take all appropriate measures to prevent or mitigate conditions related to a shared watercourse that may be harmful to other Watercourse States, whether resulting from natural causes or

human conduct, such as floods, water-borne diseases, siltation, erosion, salt-water intrusion, drought or desertification.

b) State Parties shall require any person intending to use the waters of a shared watercourse within their respective territories for purposes other than domestic or environmental use or who intends to discharge any type of waste into such waters, to first obtain a permit, licence or other similar authorisation from the relevant authority within the State concerned. The permit or other similar authorisation shall be granted only after such State has determined that the intended use or discharge will not cause significant harm on the regime of the watercourse.

5. Emergency Situations

State Parties shall, without delay, notify other potentially affected States, the SADC Water Sector Co-ordinating Unit and competent international organisations of any emergency situation originating within their respective territories and promptly supply the necessary information to such affected States and competent organisations with a view to co-operate in the prevention, mitigation, and elimination, of harmful effects of the emergency.

Article 5

Institutional Framework For Implementation

1. The following institutional mechanisms responsible for the implementation of this

Protocol are hereby established -

a) SADC Water Sector Organs

i) the Committee of Water Ministers;

ii) the Committee of Water Senior Officials;

iii) the Water Sector Co-ordinating Unit; and

iv) the Water Resources Technical Committee and sub-Committees.

b) Shared Watercourse Institutions

c) The Committee of Water Ministers shall consist of Ministers responsible for water.

d) The Committee of Water Senior Officials shall consist of the Permanent Secretaries or officials of equivalent rank responsible for water.

e) The Water Sector Coordinating Unit which shall be the executing agency of the Water Sector shall be headed by a Co-ordinator appointed by the State Party responsible for coordinating the Water Sector, and he or she shall be assisted by such supporting staff of professional, administrative and secretarial personnel as the Coordinator may deem necessary.

2. The SADC Water Sector Organs shall have the following functions:

a) The Committee of Water Ministers

i) Oversee and monitor the implementation of the Protocol and assist in resolving potential conflicts on shared watercourses.

ii) Guide and co-ordinate cooperation and harmonisation of legislation, policies, strategies, programmes and projects.

iii) Advise the Council on policies to be pursued.

iv) Recommend to Council the creation of such other organs as may be necessary for the implementation of this Protocol.

v) Provide regular updates to the Council on the status of the implementation of this Protocol.

b) The Committee of Water Senior Officials

i) Examine all reports and documents put before them by the Water Resources Technical Committee and the Water Sector Co-ordinating Unit.

ii) Initiate and advise the Committee of Water Ministers on policies, strategies, programmes and projects to be presented to the Council for approval.

iii) Recommend to the Committee of Water Ministers the creation of such other organs as may be necessary for the implementation of this Protocol.

iv) Provide regular updates to the Committee of Water Ministers on the status of the implementation of this Protocol.

c) The Water Sector Co-ordinating Unit

i) Monitor the implementation of this Protocol.

ii) Liaise with other SADC organs and Shared Watercourse Institutions on matters pertaining to the implementation of this Protocol.

iii) Provide guidance on the interpretation of this Protocol.

iv) Advise State Parties on matters pertaining to this Protocol.

v) Organise and manage all technical and policy meetings.

vi) Draft terms of reference for consultancies and manage the execution of those assignments.

vii) Mobilise or facilitate the mobilisation of financial and technical resources for the implementation of this Protocol.

viii) Annually submit a status report on the implementation of the Protocol to the Council through the Committee of Water Ministers.

ix) Keep an inventory of all shared watercourse management institutions and their agreements on shared watercourses within the SADC Region.

d) The Water Resources Technical Committee

i) Provide technical support and advice to the Committee of Water Senior Officials through the Water Sector Co-ordinating Unit with respect to the implementation of this Protocol.

ii) Discuss issues tabled by the Water Sector Co-ordinating Unit and prepare for the Committee of Water Senior Officials.

iii) Consider and approve terms of reference for consultancies, including the appointment of consultants.

iv) Recommend to the Committee of Water Senior Officials any matter of interest to it on which agreement has not been reached.

v) Appoint working groups for short-term tasks and standing sub-committees for longer term tasks.

vi) Address any other issues that may have implications on the implementation of this Protocol.

3. Shared Watercourse Institutions

a) Watercourse States undertake to establish appropriate institutions such as watercourse commissions, water authorities or boards as may be determined.

b) The responsibilities of such institutions shall be determined by the nature of their objectives which must be in conformity with the principles set out in this Protocol.

c) Shared Watercourse Institutions shall provide on a regular basis or as required by the Water Sector Co-ordinating Unit, all the information necessary to assess progress on the implementation of the provisions of this Protocol, including the development of their respective agreements.

4. State Parties undertake to adopt appropriate measures to give effect to the institutional framework referred to in this Article for the implementation of this Protocol.

Article 6

Shared Watercourse Agreements

1. In the absence of any agreement to the contrary, nothing in this Protocol shall affect the rights or obligations of a Watercourse State arising from agreements in force for it on the date on which it became a party to the Protocol.

2. Notwithstanding the provisions of paragraph 1, parties to agreements referred to in paragraph 1 may harmonise such agreements with this Protocol.

3. Watercourse States may enter into agreements, which apply the provision of this Protocol to the characteristics and uses of a particular shared watercourse or part thereof.

4. Where a watercourse agreement is concluded between two or more Watercourse States, it shall define the waters to which it applies. Such an agreement may be entered into with respect to an entire shared watercourse or any part thereof or a particular project, programme or use except insofar as the agreement adversely affects, to a significant extent, the use by one or more other Watercourse States of the waters of the watercourse, without their express consent.

5. Where some but not all Watercourse States to a particular shared watercourse are parties to an agreement, nothing contained in such agreement shall affect the rights or obligations under this Protocol of Watercourse States that are not parties to such an agreement.

6. Every Watercourse State is entitled to participate in the negotiation of and to become a party to any watercourse agreement that applies to the entire shared watercourse, as well as to participate in any relevant consultations.

7. A Watercourse State whose use of a shared watercourse may be affected to a significant extent by the implementation of a proposed watercourse agreement that applies only to a part of the watercourse or to a particular project, programme or use is entitled to participate in consultations on such an agreement and, where appropriate, in the negotiation thereof in good faith with a view to becoming a party thereto, to the extent that its use is thereby affected.

Article 7

Settlement Of Disputes

1 State Parties shall strive to resolve all disputes regarding the implementation, interpretation or application of the provisions of this Protocol amicably in accordance with the principles enshrined in Article 4 of the Treaty.

2. Disputes between State Parties regarding the interpretation or application of the provisions of this Protocol which are not settled amicably, shall be referred to the Tribunal.

3. If a dispute arises between SADC on the one hand and a State Party on the other, a request shall be made for an advisory opinion in accordance with article 16(4) of the Treaty.

Article 8

Signature

This Protocol shall be signed by the duly authorised representatives of the Member States.

Article 9

Ratification

This Protocol shall be ratified by the signatory States in accordance with their constitutional procedures.

Article 10

Entry Into Force

This Protocol and any subsequent amendments thereof shall enter into force thirty (30) days after the deposit of the instruments of ratification by two-thirds of the Member States listed in the Preamble.

Article 11

Accession

This Protocol and any subsequent amendments thereof shall remain open for accession by any Member State.

Article 12

Amendment

1. An amendment to this Protocol shall be adopted by a decision of three quarters of the Summit members who are a party to this Protocol.

2. A proposal for any amendment to this Protocol may be made to the Executive Secretary by any State Party for preliminary consideration by the Council, provided however, that the proposed amendment shall not be submitted to the Council for preliminary consideration until all Member States have been duly notified of it and a period of three

(3) months has elapsed after such notification.

Article 13

Withdrawal

1. Any State Party may withdraw from this Protocol upon the expiration of twelve (12) months from the date of giving to the Executive Secretary, a written notice to that effect.

2. Any State Party that has withdrawn pursuant to paragraph 1 shall cease to enjoy all rights and benefits under this Protocol upon the withdrawal becoming effective, but shall remain bound by the obligations herein for a period of twelve (12) months from the date of giving notice to the date the withdrawal becomes effective.

Article 14

Termination

This Protocol may be terminated by a decision of three quarters of members of the Summit.

Article 15

Depositary

1. The original of this Protocol and all instruments of ratification and accession shall be deposited with the Executive Secretary, who shall transmit certified copies to all Member States.

2. The Executive Secretary shall register this Protocol with the Secretariats of the United Nations and the Organisation of African Unity.

Article 16

Protocol on Shared Watercourse Systems in the SADC Region

1. Upon entry into force of this Protocol, the Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC) Region, which entered into force on 29th September 1998, shall be repealed and replaced by this Protocol.

The rights and obligations of any State Party to the Protocol on Shared Watercourse Systems in the SADC Region, which does not become a party to this Protocol, shall remain in force for twelve (12) months after this Protocol has entered into force.

In witness whereof, we, the Heads of State or government, or duly authorised representatives, of SADC Member States have signed this Protocol.

Done at Windhoek, this 7th day of August 2000 in three original texts in the English, French and Portuguese languages, all texts being equally authentic.

(Signed by Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe; not signed by DR Congo.

Annexure C

Agreement between the government of the Republic of Namibia and the government of the Republic of South Africa on the establishment of a permanent water commission signed at Noordoewer, 14 September 1992

PREAMBLE

The Government of the Republic of Namibia and the Government of the Republic of South Africa (hereinafter called the "Parties"),

DESIROUS of establishing a tradition of good neighbourliness and co-operation between the Parties;

RECOGNISING the importance and paucity of the water resources in the two States and the Southern African region;

CONSCIOUS that co-operation between the Parties with regard to the development of mutual projects in respect of water resources of common interest will contribute towards the prosperity and welfare of their peoples, and

WISHING to consolidate the existing friendly relations by promoting regional water resource development on the basis of the rules relating to the uses of the waters of international rivers approved in 1966 at Helsinki by the 52nd Conference of the International Law Association,

HEREBY agree as follows:

Article 1 - Establishment of a Permanent Water Commission

1. The Parties hereby establish and undertake to maintain a Permanent Water Commission (hereinafter called the "Commission").

2. The objective of the Commission shall be to act as technical adviser to the Parties on matters relating to the development and utilisation of water resources of common interest to the Parties and shall perform such other functions pertaining to the development and utilisation of such resources as the Parties may from time to time agree to assign to the Commission.

3. In furtherance of the stated objective each Party shall, to the extent permitted by its own laws and procedures, provide such information and authorisations as the Commission may require for the performance of its functions.

Article 2 - Composition and Procedures of the Commission

1. The Commission shall consist of two delegations which represent the respective Parties.

2. Each Party may appoint not more than three members to its delegation.

3. One member of each delegation shall be designated by the Party concerned as leader of its delegation.

4. The leader of a delegation may co-opt any number of persons as advisers to his delegation.

5. Meetings of the Commission shall be convened as agreed upon by it. The venue of meetings shall alternate between the territories of the Parties unless the Commission determines otherwise for a particular meeting.

6. The leader of the delegation of the Party hosting a particular meeting of the Commission shall be chairperson in respect of that meeting and shall be responsible for the preparation and timeous distribution of the agenda, including all supporting documentation, the recording and distribution of the minutes and the making available of a suitable venue.

7. All decisions of the Commission shall be taken on the basis of consensus: Provided that, in the event of the Commission failing to reach consensus, the matter under discussion shall be referred to the Parties by the respective delegations for further negotiation.

8. A quorum shall be formed by the presence of at least two members from each delegation at any meeting of the Commission.

9. The Commission shall decide its own procedure.

Article 3 - Functions and Powers of the Commission

1. The functions and powers of the Commission shall be to advise the Parties on:
(a) measures and arrangements to determine the potential of the water resources available from rivers of common interest;

(b) the reasonable demand for water from common water resources;

(c) the criteria to be adopted in the allocation and utilisation of common water resources;

(d) investigations, separately or jointly by the Parties, related to the development of any water resource of common interest including the construction, operation and maintenance of any water works in connection therewith;

(e) the prevention of and control over the pollution of common water resources and soil erosion affecting such resources;

(f) measures that can be implemented by either or both Parties to alleviate short-term problems resulting from water shortages in any river of common interest to the Parties during periods of drought, taking into consideration the availability of stored water and the water requirements within the territories of the respective Parties at that time; and

(g) such other matters as may be determined by the Commission.

2. In pursuance of the provisions of sub-article 1, the Commission shall in particular have the power to appoint consultants to assist it in the gathering and processing of information on any matter on which it is to advise the Parties and may exercise any power or make any decision relating thereto as may be agreed upon by the Parties from time to time.

3. The Commission's advice to the Parties on any matter referred to in sub-article 1 shall, if required by a Party, be contained in a report signed by the leaders of the respective delegations, who shall be responsible for the submission of the report to their respective Governments.

4. Any report prepared by the Commission on any matter referred to in sub-article 1 shall include estimates of the cost involved in the implementation of the advice of the Commission and may include proposals for the apportionment of such cost between the Parties.

5. The Commission shall in all its deliberations and recommendations to the Parties have regard for the interests any other State may have in any water resource of common interest to the Parties and that State.

Article 4 - Financial Arrangements

1. Each Party shall in respect of all meetings of the Commission be responsible for all costs incurred in connection with the attendance and participation of its delegation and of any person co-opted as adviser to its delegation in terms of Article 2 (4).

2. The Party hosting a meeting of the Commission shall be responsible for all costs incurred in making a venue available for the meeting, the preparation and distribution of the agenda and for the recording and distribution of the minutes.

3. All other costs incurred or liabilities accepted by the Commission in the performance of its functions and the exercise of its powers, shall be shared equally by the Parties unless otherwise agreed by the Commission.

...

Annexure D

Exchange of Notes between Her Majesty's Government in the United Kingdom and the Egyptian Government on the Use of Waters of the Nile for Irrigation

Signed at Cairo, on 7 May 1929

No I:
Mohammed Mahmoud Pacha to Lord Lloyd, office of the Council of Ministers (Cairo, 7 May 1929)

Your Excellency,
Further to our recent conversations, I have the honour to bring to the knowledge of your Excellency the viewpoint of the Egyptian Government on the irrigation problems, which formed the subject of our discussion.

1. The Egyptian Government wishes to acknowledge that a solution to these problems would not be deferred to a subsequent date when it became possible for the two Governments to come to terms on the status of the Sudan but, regarding the settlement of the present provisions, it expressly reserves every freedom at any negotiations which could precede such an agreement.

2. Obviously, the development of the Sudan needs a quantity of water fl owing from the Nile higher than used hitherto by the Sudan. Your Excellency is keenly aware of the fact that the Egyptian Government has always been desirous of encouraging such a development and shall continue in this direction. It would be ready to come to terms with her Majesty's Government on an increase in this quantity in so far as this would not infringe on neither the natural and historical rights of Egypt on the waters of the Nile nor on its agricultural development needs subject to obtaining satisfactory assurances with regard to the protection of Egyptian interests as set forth in the ensuing paragraphs of the present note.

3. This is why the Egyptian Government accepts the conclusions of the 1925 Nile Commission whose report features in the Annex and which is considered as forming an integral part of the present agreement. Nevertheless, in view of the delay on the construction of the Gebel Aulia dam which, according to paragraph 40 of the Nile Commission Report is considered as being the counterpart of the Gezira project, the Egyptian Government suggests that the date and the quantities of gradual sampling of waters of the Nile carried out by Sudan during the months of flood as stipulated in Article 57 of the Report of the Commission be modified in such a manner that Sudan may not take out more than 126 cubic metres per second before 1936 with the understanding that the periods set forth in the above article will remain unchanged until the stipulated figure of 126 cubic meters per second is reached. These quantities are based on the Nile Commission Report, and may therefore cover the reviews as set down in the Report.

4. It is also understood that the following provisions will be observed with regard to irrigation works of the Nile:

i. The Inspector General of the Irrigation Service in Sudan, his staff as well as other officials that the Ministry of Public Works may appoint shall have every liberty to cooperate with the resident engineer of Sennar with a view to measuring the rates of flow and the maximum levels in order that the Egyptian Government may ensure that the water distribution and control of the dam be executed in observance of the Agreement concluded. The detailed practical provisions adopted by joint agreement by the Minister of Public Works and the Irrigation Adviser to the Sudanese Government shall come into force on the date on which the present note shall be confirmed.

ii. Except with the prior consent of the Egyptian Government, no irrigation works shall be undertaken nor electric generators installed along the Nile and its branches nor on the lakes from which they flow if these lakes are situated in Sudan or in countries under British administration which could jeopardize the interests of Egypt either by reducing the quantity of water fl owing into Egypt or appreciably changing the date of its flow or causing its level to drop.

iii. In order to enable it take all necessary steps with a view to conducting a study and recording the water conservation of the Nile in Sudan, the Egyptian Government shall enjoy all the facilities required to this end.

iv. Should the Egyptian Government decide to undertake work on the river and its branches, or take steps with a view to increasing water supply for the benefit of Egypt, it shall beforehand, come to terms with the local authorities on the measures to be taken in order to safeguard local interests. The construction, maintenance and management of works mentioned above shall be placed under the direct control of the Egyptian Government.

v. The Government of Her British Majesty in the United Kingdom and Northern Ireland shall use its good offices so that the carrying out of surveys, taking of measures, the conduction of preceding paragraphs be facilitated by the Government of regions under British influence.

vi. It is obvious that within the framework of the implementation of operations envisaged by the present note, uncertainties may appear from time to time regarding the interpretation of a question of principle or technical or administrative points. Each problem of this nature shall be examined within a spirit of reciprocal honesty.
In case of a dispute arising from the interpretation or execution of the above provisions or if one of the parties contravened the stipulated provisions of the present note and should the two Governments fail to resolve this problem, this problem shall be referred to an independent body for arbitration.

5. The present agreement can in no way be considered as aff ecting the control of the River - this being a problem which will cover free discussions between the two Governments within the framework of negotiations on the Sudan.

I seize this occasion, etc.
M.MAHMOUD
Chairman of the Council of Ministers

No 2:
Lord Lloyd to Mahmoud Pacha
(Cairo, 7 May 1929)

Sir,

1. I have the honour to acknowledge receipt of the note that your Excellency addressed me today.

2. By confirming the provisions on which we mutually agreed and which were enumerated in your Excellency's note, I am entrusted with the task of expressing the satisfaction of her British Majesty's Government in the United Kingdom and Northern Ireland at the fact that these discussions have led to an agreement which will certainly facilitate the development of Egypt and the Sudan and promote their prosperity.

3. Her Majesty's Government in the United Kingdom shares the viewpoint of his Excellency on the fact that this agreement should deal, and deals essentially with the control of irrigation devices on the basis of the Nile Commission Report and does not affect the status quo in Sudan.

4. In conclusion, I would like to remind your Excellency that Her Majesty's Government in the United Kingdom has already recognized the natural and historical right of Egypt to the waters of the Nile. I am entrusted with the responsibility of declaring that Her Majesty's Government in the United Kingdom considers the observance of these rights as a fundamental principle of the policy of Great Britain and wishes to assure your Excellency that the principle of this agreement as well as its detailed stipulated provisions will be observed irrespective of the time and circumstances.

I seize this occasion, etc.
Lloyd
High Commissioner
The Residence
Cairo, 7 May 1929

Annexure E

United Arab Republic and Sudan Agreement (With Annexes) For The Full Utilization of the Nile Waters

Signed at Cairo, on 8 November 1959; in force 12 December 1959
Registered by the United Arab Republic on 7 February 1963
6519 U.N.T.S. 63

As the River Nile needs projects, for its full control and for increasing its yield for the full utilization of its waters by the Republic of the Sudan and the United Arab Republic on technical working arrangements other than those now applied:

And as these works require for their execution and administration, full agreement and co--operation between the two Republics in order to regulate their benefits and utilize the Nile waters in a manner which secures the present and future requirements of the two countries:

And as the Nile waters Agreement concluded in l929[2] provided only for the partial use of the Nile waters and did not extend to include a complete control of the River waters, the two Republics have agreed on the following:

First

THE PRESENT ACQUIRED RIGHTS

1. That the amount of the Nile waters used by the United Arab Republic until this Agreement is signed shall be her acquired right before obtaining the benefits of the Nile Control Projects and the projects which will increase its yield and which projects are referred to in this Agreement; The total of this acquired right is 48 Milliards of cubic meters per year as measured at Aswan.

2. That the amount of the waters used at present by the Republic of Sudan shall be her acquired right before obtaining the benefits of the projects referred to above. The total amount of this acquired right is 4 Milliards of cubic meters per measured at Aswan.

Second

THE NILE CONTROL PROJECTS AND THE DIVISION OF THEIR BENEFITS BETWEEN THE TWO REPUBLICS

1. In order to regulate the River waters and control their flow into the sea, the two Republics agree that the United Arab Republic constructs the Sudd el Aali at Aswan as the first link of a series of projects on the Nile for over-year storage.

2. In order to enable the Sudan to utilize its share of the water, the two Republics agree that the Republic of Sudan shall construct the Roseires Darn on the Blue Nile and any other works which the Republic of the Sudan considers essential for the utilization of its share.

3. The net benefit from the Sudd el Aali Reservoir shall be calculated on the basis of the average natural River yield of water at Aswan in the years of this century, which is estimated at about 84 Milliards of cubic meters per year. The acquired rights of the two Republics referred to in Article "First" as measured at Aswan, and the average of losses of over-year storage of the Sudd El Aali Reservoir shall be deducted from this yield, and the balance shall be the net benefit which shall be divided between the two Republics.

4. The net benefit from the Sudd el Aali Reservoir mentioned in the previous item, shall be divided between the two Republics at the ratio of 14½ for the Sudan and 7½ for the United Arab Republic so long as the average river yield remains in future within the limits of the average yield referred to in the previous paragraph. This means that, if the average yield remains the same as the average of the previous years of this century which is estimated at 84 Milliards, and if the losses of over-year storage remain equal to the present estimate of 10 Milliards, the net benefit of the Sudd el Aali Reservoir shall be 22 Milliards of which the share of the Republic of the Sudan shall be 14½ Milliards and the share of the United Arab Republic shall be 7½ Milliards. By adding these shares to their acquired rights, the total share from the net yield of the Nile after the full operation of the Sudd el Aali Reservoir shall be 18½ Milliards for the Republic of the Sudan and 55½ Milliards for the United Arab Republic.

But if the average yield increases, the resulting net benefit from this increase shall be divided between the two Republics, in equal shares.

5. As the net benefit from the Sudd el Aali (referred to in item 3 Article Second) is calculated on the basis of the average natural yield of the river at Aswan in the years of this century after the deduction therefrom of the acquired rights of the two Republics and the average losses of over-year storage at the Sudd el Aali Reservoir, it is agreed that this net benefit shall be the subject of revision by the two parties at reasonable intervals to be agreed upon after starting the full operation of the Sudd el Aali Reservoir.

6. The United Arab Republic agrees to pay to the Sudan Republic 15 Million Egyptian Pounds as full compensation for the damage resulting to the Sudanese existing properties as a result of the storage in the Sudd el Aali Reservoir up to a reduced level of 182 meters (survey datum). The payment of this compensation shall be affected in accordance with the annexed agreement between the two parties.

7. The Republic of the Sudan undertakes to arrange before July 1963, the final transfer of the population of Halfa and all other Sudanese inhabitants whose lands shall be submerged by the stored water.

8. It is understood that when the Sudd el Aali is fully operated for over-year storage, the United Arab Republic will not require storing any water at Gebel Aulia Dam. And

the two contracting parties will in due course, discuss all matters related to this renunciation.

Third

PROJECTS FOR THE UTILIZATION OF LOST WATERS IN THE NILE BASIN

In view of the fact that at present, considerable volumes of the Nile Basin Waters are lost in the swamps of Bahr El Jebel, Bahr El Zeraf, Balir el Ghazal and the Sobat River, and as it is essential that efforts should be exerted in order to prevent these losses and to increase the yield of the River for use in agricultural expansion in the two Republics, the two Republics agree to the following:

1. The Republic of the Sudan in agreement with the United Arab Republic shall construct projects for the increase of the River yield by preventing losses of waters of the Nile Basin in the swamps of Bahr El Jebel, Bahr el Zeraf, Bahr el Ghazal and its tributaries, the Sobat River and its tributaries and the White Nile Basin. The net yield of these projects shall be divided equally between the two Republics and each of them shall also contribute equally to the costs.

The Republic of the Sudan shall finance the above-mentioned projects out of its own funds and the United Arab Republic shall pay its share in the costs in the same ratio of 50% allotted for her in the yield of these projects.

2. If the United Arab Republic, on account of the progress in its planned agricultural expansion should find it necessary to start on any of the increase of the Nile yield projects, referred to in the previous paragraph, after its approval by the two Governments and at a time when the Sudan Republic does not need such project, the United Arab Republic shall notify the Sudan Republic of the time convenient for the former to start the execution of the project. And each of the two Republics shall, within two years after such notification, present a date-phased programme for the utilization of its share of the waters saved by the project, and each of the said programmes shall bind the two parties. The United Arab Republic shall at the expiry of the two years, start the execution of the projects, at its own expense. And when the Republic of Sudan is ready to utilize its share according to the agreed programme, it shall pay to the United Arab Republic a share of all the expenses in the same ratio as the Sudan's share in benefit is to the total benefit of the project; provided that the share of either Republic shall not exceed one half of the total benefit of the project.

Fourth

TECHNICAL CO-OPERATION BETWEEN THE TWO REPUBLICS

1. In order to ensure the technical co-operation between the Governments of the two Republics, to continue the research and study necessary for the Nile control projects and the increase of its yield and to continue the hydrological survey of its upper reaches, the two Republics agree that immediately after the signing of this

Agreement a Permanent joint Technical Commission shall be formed of an equal number of members from both parties; and its functions shall be:

a. The drawing of the basic outlines of projects for the increase of the Nile yield, and for the supervision of the studies necessary for the finalising of projects, before presentation of the same to the Governments of the two Republics for approval.
b. The supervision of the execution of the projects approved by the two Governments.
c. The drawing up of the working arrangements for any works to be constructed on the Nile, within the boundaries of the Sudan, and also for those to be constructed outside the boundaries of the Sudan, by agreement with the authorities concerned in the countries in which such works are constructed.
d. The supervision of the application of all the working arrangements mentioned in (c) above in connection with works constructed within the boundaries of Sudan and also in connection with the Sudd el Aali Reservoir and Aswan Dam, through official engineers delegated for the purpose by the two Republics; and the supervision of the working of the upper Nile projects, as provided in the agreements concluded with the countries in which such projects are constructed.
e. As it is probable that a series of low years may occur, and a succession of low levels in the Sudd el Aali Reservoir may result to such an extent as not to permit in any one year the drawing of the full requirements of the two Republics, the Technical Commission is charged with the task of devising a fair arrangement for the two Republics to follow. And the recommendations of the Commission shall be presented to the two Governments for approval.

2. In order to enable the Commission to exercise the functions enumerated in the above item, and in order to ensure the continuation of the Nile gauging and to keep observations on all its upper reaches, these duties shall be carried out under the technical supervision of the Commission by the engineers of the Sudan Republic, and the engineers of the United Arab Republic in the Sudan and in the United Arab Republic and in Uganada.

3. The two Governments shall form the Joint Technical Commission, by a joint decree, and shall provide it with its necessary funds from their budgets. The Commission may, according to the requirements of work, hold its meetings in Cairo or in Khartoum. The Commission shall, subject to the approval of the two Governments, lay down regulations for the organisation of its meetings and its technical, administrative and financial activities.

Fifth
GENERAL PROVISIONS

1. If it becomes necessary to hold any negotiations concerning the Nile waters, with any riparian state, outside the boundaries of the two Republics, the Governments of

the Sudan Republic and the United Arab Republic shall agree on a unified view after the subject is studied by the said Technical Commission. The said unified view shall be the basis of any negotiations by the Commission with the said states.

If the negotiations result in an agreement to construct any works on the river, outside the boundaries of the two Republics, the joint Technical Commission shall after consulting the authorities in the Governments of the States concerned, draw all the technical execution details and the working and maintenance arrangements. And the Commission shall, after the sanction of the same by the Governments concerned, supervise the carrying out of the said technical agreements.

2. As the riparian states, other than the two Republics, claim a share in the Nile waters, the two Republics have agreed that they shall jointlv consider and reach one unified view regarding the said claims. And if the said consideration results in the acceptance of allotting an amount of the Nile water to one or the other of the said states, the accepted amount shall be deducted from the shares of the two Republics in equal parts, as calculated at Aswan.

The Technical Commission mentioned in this agreement shall make the necessary arrangements with the states concerned, in order to ensure that their water consumption shall not exceed the amounts agreed upon.

Sixth

TRANSITIONAL PERIOD BEFORE BENEFITING FROM THE COMPLETE SUDD EL AALI RESERVOIR

As the benefiting of the two Republics from their appointed shares in the net benefit of the Sudd el Aali Reservoir shall not start before the construction and the full utilization of the Reservoir, the two parties shall agree on their agricultural expansion programmes in the transitional period from now up to the completion of the Sudd el Aali without prejudice to their present water requirements.

Seventh

This Agreement shall come into force after its sanction by the two contracting parties, provided that either party shall notify the other party of the date of its sanction, through the diplomatic channels.

Eighth

Annex (1) and Annex (2, A and B) attached to this Agreement shall be considered as an integral part of this Agreement.

Written in Cairo in two Arabic original copies this 7th day of Gumada El Oula 1379, the 8th day of November 1959.

For the Republic of Sudan:

For the United Arab Republic:

(*signed*) Lewa Mohammed Talaat Farid (*signed*) Zakaria Mohie El Din

ANNEX 1

A SPECIAL PROVISION FOR THE WATER LOAN REQUIRED BY THE UNITED ARAB REPUBLIC

The Republic of the Sudan agrees in principle to give a water loan from the Sudan's share in the Sudd el Aali waters, to the United Arab Republic, in order to enable the latter to proceed with her planned programmes for Agricultural Expansion.

The request of the United Arab Republic for this loan shall be made after it revises its programmes within five years from the date of the signing of this agreement. And if the revision by United Arab Republic reveals her need for this loan, the Republic of the Sudan shall give it out of its own share a loan not exceeding one and a half Milliards, provided that the utilisation of this loan shall cease in November, 1977.

ANNEX 2

A

To the Head of the Delegation of the Republic of Sudan

With reference to Article (Second) paragraph 6 of the Agreement signed this day, concerning the full utilization of the River Nile Waters, compensation amounting to 15 Million Egyptian Pounds in sterling or in a third currency agreed upon by the two parties and calculated on the basis of a fixed rate of$2.87156 to the Egyptian Pound, shall be paid by the Government of the United Arab Republic, as agreed upon, in instalments in the following manner:

£ 3 million on the first of January, 1960
£ 4 million on the first of January, 1961
£ 4 million on the first of January, 1962
£ 4 million on the first of January, 1963
I shall be grateful if you confirm your agreement to the above.

With highest consideration.

Head of the United Arab Republic Delegation:
(*signed*) Zakaria Mohie El Din

B

To the Head of United Arab Republic Delegation

I have the honour to acknowledge receipt of your letter dated today and stipulating the following :

[*See Annex 2, A*]

I have the honour to confirm the agreement of the Government of the Republic of the Sudan to the contents of the said letter.

With highest consideration.

Head of the Delegation of the Republic of Sudan:
(*signed*) Lewa Mohamed Talaat Fari

1. Translation by the Government of the United Arab Republic.
2. *League of Nations, Treaty Series,* Vol. XCIII, p.43.

Annexure F

Agreement on the Nile River Basin Cooperative Framework

Preamble

The States of the Nile River Basin,

Affirming the importance of the Nile River to the economic and social well-being of the peoples of the States of the Nile River Basin;

Motivated by the desire to strengthen their cooperation in relation to the Nile River, a great and vital natural resource which binds them together, and in relation to the sustainable development of the Nile River Basin;

Recognizing that the Nile River, its natural resources and environment are assets of immense value to all the riparian countries;

Convinced that a framework agreement governing their relations with regard to the Nile River Basin will promote integrated management, sustainable development, and harmonious utilization of the water resources of the Basin, as well as their conservation and protection for the benefit of present and future generations;

Convinced also that it is in their mutual interest to establish an organization to assist them in the management and sustainable development of the Nile River Basin for the benefit of all;

Mindful of the global initiatives for promoting cooperation on integrated management and sustainable development of water resources;

Have agreed as follows:

Article 1

Scope of the Present Framework

The present Framework applies to the use, development, protection, conservation and management of the Nile River Basin and its resources and establishes an institutional mechanism for cooperation among the Nile Basin States.

Article 2

Use of Terms

For the purposes of the present Cooperative Framework Agreement:

(a) “Nile River Basin” means the geographical area determined by the watershed limits of the Nile River system of waters; this term is used where there is reference to environmental protection, conservation or development;

(b) “Nile River system” means the Nile River and the surface waters and groundwaters which are related to the Nile River; this term is used where there is reference to utilization of water;

(c) “Framework” means the present Cooperative Framework Agreement;

(d) “State of the Nile River Basin”, “Nile Basin State” or “Basin state” means a State party to the present Framework in whose territory part of the Nile River Basin is situated;

(e) “The Commission” means the Nile River Basin Commission established under Part III of the present Framework;

(f) “Water security” means the right of all Nile Basin States to reliable access to and use of the Nile River system for health, agriculture, livelihoods, production and environment.

PART I. GENERAL PRINCIPLES

Article 3

General Principles

The Nile River Basin and the Nile River System shall be protected, used, conserved and developed in accordance with the following general principles:

1. Cooperation

The principle of cooperation between States of the Nile River Basin on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection and conservation of the Nile River Basin and to promote joint efforts to achieve social and economic development.

2. Sustainable development

The principle of sustainable development of the Nile River Basin.

3. Subsidiarity

The principle of subsidiarity, whereby development and protection of the Nile River Basin water resources is planned and implemented at the lowest appropriate level.

4. Equitable and reasonable utilization

The principle of equitable and reasonable utilization of the waters of the Nile River System.

5. Prevention of the causing of significant harm

The principle of preventing the causing of significant harm to other States of the Nile River Basin.

6. The right of Nile Basin States to use water within their territories

The principle that each Nile Basin State has the right to use, within its territory, the waters of the Nile River System in a manner that is consistent with the other basic principles referred to herein.

7. Protection and conservation

The principle that Nile Basin States take all appropriate measures, individually and, where appropriate, jointly, for the protection and conservation of the Nile River Basin and its ecosystems.

8. Information concerning planned measures

The principle that the Nile Basin States exchange information on planned measures through the Nile River Basin Commission.

9. Community of interest

The principle of the community of interest of the Nile Basin States in the Nile River System.

10. Exchange of data and information

The principle of the regular and reciprocal exchange among States of the Nile River Basin of readily available and relevant data and information on existing measures and on the condition of water resources of the Basin, where possible in a form that facilitates its utilization by the States to which it is communicated.

11. Environmental impact assessment and audits

The principle of environmental impact assessment and audits.

12. Peaceful resolution of disputes

The principle of the peaceful resolution of disputes.

13. Water as a finite and vulnerable resource

The principle that fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment, and must be managed in an integrated and holistic manner, linking social and economic development with protection and conservation of natural ecosystems.

12. Water has social and economic value

The principle that water is a natural resource having social and economic value, whose utilization should give priority to its most economic use, taking into account the satisfaction of basic human needs and the safeguarding of ecosystems.

15. Water security

The principle of water security for all Nile Basin States.

PART II. RIGHTS AND OBLIGATIONS

Article 4

Equitable and reasonable utilization

1. Nile Basin States shall in their respective territories utilize the water resources of the Nile River System in an equitable and reasonable manner. In particular, those water resources shall be used and developed by Nile Basin States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the Basin States concerned, consistent with adequate protection of those water resources. Each Basin State is entitled to an equitable and reasonable share in the beneficial uses of the water resources of the Nile River System.

2. In ensuring that their utilization of Nile River System water resources is equitable and reasonable, Nile Basin States shall take into account all relevant factors and circumstances, including but not limited to the following:

(a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;

(b) The social and economic needs of the Basin States concerned;

(c) The population dependent on the water resources in each Basin State;

(d) The effects of the use or uses of the water resources in one Basin State on other Basin States;

(e) Existing and potential uses of the water resources;

(f) Conservation, protection, development and economy of use of the water resources and the costs of measures taken to that effect;

(g) The availability of alternatives, of comparable value, to a particular planned or existing use;

(h) The contribution of each Basin State to the waters of the Nile River system;

(i) The extent and proportion of the drainage area in the territory of each Basin State.

In the application of paragraphs 1 and 2 above, the Nile Basin States concerned shall, when the need arises, enter into consultations in a spirit of cooperation.

4. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

5. Nile Basin States shall, in their respective territories, according to their national laws and regulations, keep the status of their water utilization under review in light of substantial changes in relevant factors and circumstances.

6. Nile Basin States shall observe the rules and procedures established by the Nile River Basin Commission for the effective implementation of equitable and reasonable utilization.

Article 5

Obligation not to cause significant harm

1. Nile Basin States shall, in utilizing Nile River System water resources in their territories, take all appropriate measures to prevent the causing of significant harm to other Basin States.

2. Where significant harm nevertheless is caused to another Nile Basin State, the State, whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard to the provisions of Article 4 above, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

Article 6

Protection and conservation of the Nile River Basin and its ecosystems

1. Nile Basin States shall take all appropriate measures, individually and, where appropriate, jointly, to protect, conserve and, where necessary, rehabilitate the Nile River Basin and its ecosystems, in particular, by:

(a) protecting and improving water quality within the Nile River Basin;

(b) preventing the introduction of species, alien or new, into the Nile River system which may have effects detrimental to the ecosystems of the Nile River Basin;

(c) protecting and conserving biological diversity within the Nile River Basin;

(d) protecting and conserving wetlands within the Nile River Basin; and

(e) restoring and rehabilitating the degraded natural resource base.

2. Nile Basin States shall, through the Nile River Basin Commission, take steps to harmonize their policies in relation to the provisions of this article.

Article 7

Regular exchange of data and information

1. In pursuance of their cooperation concerning the use, development and protection of the Nile River Basin and its water resources, Nile Basin States shall on a regular basis exchange readily available and relevant data and information on existing measures and on the condition of water resources of the Basin, where possible in a form that facilitates its utilization by the States to which it is communicated.

2. If a Nile Basin State is requested by another Basin State to provide data or information that is not readily available, it shall employ its best efforts to comply with

the request but may condition its compliance upon payment by the requesting State of the reasonable costs of collecting and, where appropriate, processing such data or information.

3. In the implementation of their obligations under Paragraph 1 and 2, Nile Basin States agree to observe procedures to be developed by the Nile River Basin Commission.

Article 8

Planned measures

1. Nile Basin States agree to exchange information through the Nile River Basin Commission.

2. Nile Basin States shall observe the rules and procedures established by the Nile River Basin Commission for exchanging information concerning planned measures.

Article 9

Environmental impact assessment and audits

1. For planned measures that may have significant adverse environmental impacts, Nile Basin States shall, at an early stage, undertake a comprehensive assessment of those impacts with regard to their own territories and the territories of other Nile Basin States.

2. The criteria and procedures for determining whether an activity is likely to have significant adverse environmental impacts shall be developed by the Nile River Basin Commission.

3. Where circumstances so warrant, according to criteria to be developed by the Nile River Basin Commission, a Nile Basin State that has implemented measures of the kind referred to in paragraph 1 shall conduct an audit of the environmental impacts of those measures. That State shall enter into consultations relating to the audit with Nile Basin States affected by the measures on their request.

4. The Commission, taking into account national legislation of the Nile Basin States, shall adopt criteria for carrying out audits of measures existing at the date of the entry into force of this Framework.

5. Nile Basin States shall carry out audits of measures existing at the date of the entry into force of this Framework in accordance with national legislation and under criteria adopted under this Framework.

Article 10

Subsidiarity in the development and protection of the Nile River Basin

In planning and implementing a project pursuant to the principle of subsidiarity set forth in Article 3(3), Nile Basin States shall:

(a) allow all those within a State who will or may be affected by the project in that State to participate in an appropriate way in the planning and implementation process;

(b) make every effort to ensure that the project and any related agreement is consistent with the basin-wide framework.

Article 11

Prevention and mitigation of harmful conditions

Nile Basin States shall, individually and, where appropriate, jointly through cost-sharing by the Nile Basin State or States that may be affected, make every effort to take all appropriate measures to prevent or mitigate conditions related to the Nile River System that may be harmful to other Nile Basin States, whether resulting from human conduct or natural causes, such as flood conditions, invasive water weeds, water-borne diseases, siltation, erosion, drought or desertification. In implementing this provision, Nile Basin States shall take into account guidelines to be developed by the Nile River Basin Commission.

Article 12

Emergency Situations

1. For the purposes of this provision, “emergency” means a situation that causes, or poses an imminent threat of causing, serious harm to Nile Basin States or other States and that results suddenly from natural causes, such as floods, landslides or earthquakes, or from human conduct, such as industrial accidents.

2. A Nile Basin State shall, without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations of any emergency originating in its territory.

3. A Nile Basin State within whose territory an emergency originates shall, in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency.

4. When necessary, Nile Basin States shall jointly develop contingency plans for responding to emergencies, in cooperation, where appropriate, with other potentially affected States and competent international organizations.

Article 13

Protection of the Nile River Basin and related installations in time of armed conflict

The Nile River System and related installations, facilities and other works, as well as installations containing dangerous forces in the Nile River Basin, shall enjoy the protection accorded by the principles and rules of international law applicable in international and non-international armed conflict, in particular rules of international humanitarian law, and shall not be used in violation of those principles and rules.

Article 14

Water Security

Having due regard to the provisions of Articles 4 and 5, Nile Basin States recognize the vital importance of water security to each of them. The States also recognize that the cooperation management and development of waters of the Nile River System will facilitate achievement of water security and other benefits. Nile Basin

States therefore agree, in a spirit of cooperation:

(a) to work together to ensure that all states achieve and sustain water security;

(b)* ...

PART III. INSTITUTIONAL STRUCTURE

SECTION A. THE NILE RIVER BASIN COMMISSION

Article 15

Establishment

The Nile River Basin Commission is hereby established by the Nile River Basin States.

Article 16

Purpose and Objective

The purpose and objective of the Commission is:

(a) To promote and facilitate the implementation of the principles, rights and obligations provided for in the present Framework;

(b) To serve as an institutional framework for cooperation among Nile Basin States in the use, development, protection, conservation and management of the Nile River Basin and its waters;

(c) To facilitate closer cooperation among the States and peoples of the Nile River Basin in the social, economic and cultural fields.

Article 17

Organs

The Commission is comprised of:

(a) Conference of Heads of State and Government

(b) Council of Ministers

(c) Technical Advisory Committee

(d) Sectoral Advisory Committees

(e) Secretariat

Article 18

Headquarters

The headquarters of the Commission shall be situated at Entebbe, Uganda.

Article 19

Legal Status

1. The Commission is established as an intergovernmental organization and shall enjoy international legal personality, with such legal capacity as may be necessary for the performance of its functions, in particular, the capacity to enter into agreements, to incur obligations, to receive donations, and to sue and be sued in its own name.

2. The Commission and its officials shall, in the territory of each Nile Basin State, enjoy such privileges and immunities as are necessary for the performance of their functions under this Framework.

3. The privileges and immunities referred to under this article shall be provided for in detail in a Protocol to this Framework.

SECTION B. THE CONFERENCE OF HEADS OF STATE AND GOVERNMENT

Article 20

Structure and Procedures

1. The Conference of Heads of State and Government (“the Conference”) shall be composed of Heads of State and Government of Nile Basin States.

2. The Conference shall establish its own rules and procedures.

Article 21

Functions

The Conference shall be the supreme policy-making organ of the Commission.

SECTION C. THE COUNCIL OF MINISTERS

Article 22

Structure

The Council of Ministers (the “Council”) shall be composed of the Ministers responsible for water affairs of the Nile Basin States and other ministers depending on the agenda of the Commission.

Article 23

Procedures

1. Except as otherwise provided, the Council shall establish its own rules and procedures.

2. The Council shall convene once a year in regular session and in special session at the request of any Nile Basin State.

3. Unless the Council decides otherwise, the venue of regular sessions shall rotate among the Nile Basin States in alphabetical order, in English. The venue of a special session shall be the same as that of the preceding regular session.

4. A regular session shall be chaired by the Nile Basin State in which it is held. A special session shall be chaired by the State that chaired the next preceding regular session.

5. Decisions of the Council shall be taken by consensus.

6. Decisions of the Council are binding on all Nile Basin States.

Article 24

Functions

1. The Council is the governing body of the Commission. It may refer matters to the Conference of Heads of State for decision.

2. The Council serves as a forum for discussion of matters within the scope of its functions and the Framework.

3. The Council oversees the effective implementation of the Framework.

4. The Council may establish, and assign responsibilities to any ad hoc committees it considers to be necessary for the proper fulfillment of its functions.

5. The Council adopts, keeps under review and revises as necessary, plans for the coordinated, integrated, and sustainable management and development of the Nile River Basin.

6. The Council approves the annual work programs of the Commission.

7. The Council ensures the financial sustainability of the Commission.

8. The Council approves rules and procedures governing the operations of the Technical Advisory Committee, Sectoral Advisory Committees, and the Secretariat, as well as its work program and financial and staff regulations.

9. The Council appoints the Executive Secretary and other senior staff of the Commission.

10. The Council makes determinations concerning the staffing and organizational structure of the Secretariat.

11. The Council adopts, keeps under review and revises as necessary, rules, procedures, guidelines and criteria for the implementation of the provisions of this Framework.

12. The Council examines and makes decisions regarding the determination of equitable and reasonable use of water in each riparian country taking into consideration the factors provided in Article 4, paragraph 2.

13. At the request of the States concerned, the Council addresses questions and differences that may arise between Nile Basin States concerning the interpretation or application of the Framework. It may make recommendations to the States concerned with regard to such questions and differences.

14. The Council promotes the full and effective application of the Framework.

15. The Council decides upon a sliding scale of contributions of Nile Basin States for the financing of the budget of the Commission, and approves the budget of the Commission.

16. Where appropriate, the Council decides upon formulas for cost and benefit sharing by Nile Basin States in respect of particular joint projects within the Nile River Basin.

17. The Council performs such other functions in the effectuation of the purposes of the Commission as it may decide.

SECTION D. THE TECHNICAL ADVISORY COMMITTEE

Article 25

Structure and Procedures

1. The Technical Advisory Committee (the “TAC”) shall be composed of two members from each Nile Basin State who shall be senior officials. Delegates may bring other experts to meetings of the TAC as necessary to deal with special questions.

2. The TAC may establish specialized Working Groups to deal with matters within its competence.

3. The TAC shall convene twice a year in regular session, and in special session if and as the Council, through its Chair, so requests. Unless otherwise decided, the venue for sessions shall be the headquarters of the Commission.

4. The TAC shall propose, for the approval of the Council, its own rules and procedures.

Article 26

Functions

1. The TAC shall prepare for the consideration of the Council cooperative programs for the integrated and sustainable management and development of the Nile River Basin.

2. On the basis of reports from the Secretariat, the TAC shall make recommendations to the Council concerning annual work programs and budget of the Commission.

3. The TAC shall propose to the Council rules, procedures, guidelines and criteria provided for in this Framework.

4. The TAC shall make recommendations to the Council on the implementation of the provisions of this Framework.

5. The TAC shall make recommendations to the Council on decisions regarding the determination of equitable and reasonable use of water in each riparian country taking into consideration the factors provided in Article 4, paragraph 2.

6. The TAC shall advise the Council on technical matters relating to the use, development, protection, conservation and management of the Nile River Basin and the Nile River System, including protection from drought and floods.

7. The TAC shall make proposals to the Council concerning appointment of the Executive Secretary and senior technical staff of the Secretariat, and supervises the Secretariat.

8. The TAC shall make recommendations to the Council concerning rules and procedures governing the operations of the Secretariat, as well as its work program.

9. When directed to do so by the Council, the TAC shall make recommendations to the Council concerning the modification of the Framework or the elaboration of protocols.

10. The TAC shall perform such other functions as may from time to time be assigned to it by the Council.

SECTION E. SECTORAL ADVISORY COMMITTEES

Article 27

Structure and Procedures

1. Sectoral Advisory Committees (“SACs”) may be established by the Council to deal with specific sectoral matters within the competence of the Commission.

2. Unless the Council decides otherwise, a SAC shall be composed of one member from each Nile Basin State who is an expert in the field of activity of the SAC in question.

3. SACs shall be governed by the rules and procedures applicable to the TAC, mutatis mutandis.

4. The Council may establish a SAC charged with establishing linkage between sub-basin organizations and the Commission.

Article 28

Functions

SACs shall discharge the tasks assigned to them by the Council.

SECTION F. THE SECRETARIAT

Article 29

Structure

1. The Secretariat shall be headed by an Executive Secretary who shall be appointed for a three year term by the Council.

2. The Executive Secretary shall be accountable to the Council through the TAC.

3. The Executive Secretary and the officials of the Secretariat shall enjoy in Nile Basin States the privileges and immunities necessary for the performance of their functions.

4. The staff and structure of the Secretariat shall be determined by the Council on the recommendation of the TAC, taking into account the principle of geographic distribution.

5. The office of the Secretariat shall be situated at the Headquarters of the Commission.

Article 30

Functions

1. The Executive Secretary shall represent the Commission in matters specified in the rules and procedures governing its operations and in particular in its relations with international and bilateral assistance institutions and with any Nile sub-basin institutions or arrangements.

2. The Secretariat shall serve as the secretariat for meetings of all organs of the Commission.

3. The Executive Secretary shall be responsible for the administration and finances of the Commission.

4. The Executive Secretary shall prepare, taking into account any information provided by National Nile Focal Point Institutions, and shall submit reports to the TAC concerning the annual work programs of the Commission.

5. The Executive Secretary shall prepare a proposed budget of the Commission and submit it to the TAC.

6. The Executive Secretary shall be responsible for the carrying out of studies and the performance of other activities proposed by the TAC and authorized by the Council. The Executive Secretary may engage consultants with the approval of the TAC to assist in the performance of these functions.

7. The Secretariat shall assist the TAC with the preparation of a plan for the coordinated, integrated, and sustainable management and development of the Nile River Basin.

8. The Secretariat shall provide other assistance to all organs of the Commission, on their request, concerning matters related to the discharge of their functions.

9. The Secretariat shall compile available data and information and coordinate the monitoring of information relating to the Nile Basin, including information concerning water resources, the environment and socio-economic matters, review and synthesize the information with a view to integrating it into basin-wide databases and establishing standards, and develop mechanisms for the regular exchange of information where needed.

10. The Secretariat shall receive reports from sub-basin organizations and transmits the reports to TAC for its consideration.

11. The Secretariat shall perform any other functions assigned to it by the TAC.

SECTION G.

SUCCESSION OF THE

NILE RIVER BASIN COMMISSION

TO THE

NILE BASIN INITIATIVE

Article 31

Succession

Upon the entry into force of this Framework the Commission shall succeed to all rights, obligations and assets of the Nile Basin Initiative (NBI).

PART IV. SUBSIDIARY INSTITUTIONS

Article 32

Sub-Basin organizations and arrangements

1. Nile Basin States shall recognize the utility of sub-basin organizations and arrangements.

2. The parties to the Framework that are also members of sub-basin organizations or arrangements shall undertake to ensure that the purposes, functions and activities of such organizations and arrangements are consistent with those of the Nile River Basin

Commission and with the principles and rules set out in, or adopted under, the Framework.

3. The parties to the Framework that are also members of sub-basin organizations or arrangements further undertake to ensure that such organizations or arrangements work in close cooperation with the Nile River Basin Commission.

4. The Nile River Basin Commission shall maintain regular contact, and shall cooperate closely, with any sub-basin organization or arrangement.

Article 33

National Nile Focal Point Institutions

1. Each Nile Basin State shall establish or designate a National Nile Focal Point Institution and notify the Commission thereof.

2. The function of National Nile Focal Point Institutions shall serve as national focal points for the Commission with regard to matters within the competence of the Commission.

PART V. MISCELLANEOUS PROVISIONS

Article 34

Settlement of disputes

1. In the event of a dispute between two or more Nile Basin States concerning the interpretation or application of the present Framework, the States concerned shall, in the absence of an applicable agreement between them, seek a settlement of the dispute by peaceful means in accordance with the following provisions:

(a) If the States concerned cannot reach agreement by negotiation requested by one of them, they may jointly seek good offices, or request mediation or conciliation by, the Nile River Basin Commission or other third party, or agree to submit the dispute to arbitration, in accordance with procedures to be adopted by the Council, or to the International Court of Justice.

(b) If after six months from the time of the request for negotiations referred to in paragraph 2, the States concerned have not been able to settle their dispute through negotiation or any other means referred to in paragraph 2, the dispute shall be submitted, at the request of any of the parties to the dispute, to impartial fact-finding in accordance with the Annex on the fact-finding Commission, unless the States concerned otherwise agree.

Article 35

Supplementary instruments

1. Nile Basin States may adopt bilateral or multilateral instruments that supplement the present Framework, concerning portions of the Nile River Basin or the Nile River

system, such as sub-basins and tributaries, or concerning individual projects or programs relating to the Nile River Basin or the Nile River system, or portions thereof.

2. The supplementary instruments referred to in paragraph 1 shall apply the principles of the present Framework to the subject matter of those instruments.

3. Any other instruments or arrangements entered into by the Nile Basin States shall not be inconsistent with the provisions of the present Framework.

4. Supplementary instruments may be adopted as Protocols to the present Framework by consensus of Nile Basin States.

PART VI. FINAL CLAUSES

Article 36

Amendment of the Framework or Protocols

1. Amendments to this Framework may be proposed by any State Party. Amendments to any protocol may be proposed by any State to that protocol.

2. Amendments to this Framework shall be adopted at a meeting of the State Parties. Amendments to any protocol shall be adopted at a meeting of the State Parties to the Protocol in question.

3. Articles 1, 2, 3, 4, 5, 8, 9, 14, 23, 24, 34, 35, 36 and 37 of the present Framework may be amended only by consensus. As to proposed amendments to other articles or to any protocol, the Parties shall make every effort to reach agreement by consensus. If all efforts at consensus have been exhausted, and no agreement has been reached, the amendment shall as a last resort be adopted by a two-thirds majority vote of the State Parties to the instrument in question present and voting at the meeting, and shall be submitted by the Depositary to all State Parties for ratification, acceptance or approval.

Article 37

Adoption and Amendment of Annexes

1. The annexes to this Framework or to any protocol shall form an integral part of the Framework or of such protocol, as the case may be, and, unless expressly provided otherwise, a reference to this Framework or its protocols shall constitute at the same time a reference to any annexes thereto. Such annexes shall be restricted to procedural, scientific, technical and administrative matters agreed upon by the parties.

2. Except as may be otherwise provided in any protocol with respect to its annexes, the following procedure shall apply to the proposal, adoption and entry into force of additional annexes to this Framework or of annexes to any protocol:

(a) Annexes to this Framework or to any protocol shall be proposed and adopted according to the procedure laid down in Article 36. In particular, any annex relating to

one of the articles listed in paragraph 3 of Article 36, which may be amended only by consensus, must be adopted by consensus;

(b) Any Party that is unable to approve an additional annex to this Framework or an annex to any protocol to which it is Party shall so notify the Depositary, in writing, within one year from the date of the communication of the adoption by the Depositary. The Depositary shall without delay notify all Parties of any such declaration of objection received. A Party may at any time withdraw a previous declaration of objection and the annexes shall thereupon enter into force for that Party subject to subparagraph (c) below;

(c) On the expiry of one year from the date of the communication of the adoption by the Depositary, the annex shall enter into force for all Parties to this Framework or to any protocol concerned which have not submitted a notification in accordance with the provisions of subparagraph (b) above.

3. The proposal, adoption and entry into force of amendments to annexes to this Framework or to any protocol shall be subject to the same procedure as for the proposal, adoption and entry into force of annexes to the Framework or annexes to any protocol.

4. If an additional annex or an amendment to an annex is related to an amendment to this Framework or to any protocol, the additional annex or amendment shall not enter into force until such time as the amendment to the Framework or to the protocol concerned enters into force.

Article 38

Relationship between this Framework and Its Protocols

1. A State may not become a party to a protocol to this Framework unless it is, or becomes at the same time, a party to this Framework.

2. Decisions under any protocol shall be taken only by the Parties to the protocol concerned. Any Nile Basin State that has not ratified a protocol may participate as an observer in any meeting of the parties to that protocol.

Article 39

Reservations

No reservations may be made to this Framework.

Article 40

Withdrawal

1. At any time after two years from the date on which this Framework has entered into force for a State Party, that State Party may withdraw from the Framework by giving written notification to the Depositary.

2. Any such withdrawal shall take place upon expiry of one year after the date of its receipt by the Depositary, or on such later date as may be specified in the notification of the withdrawal, during which period the notifying State shall continue to be bound by the Framework.

3. Any State Party which withdraws from this Framework shall be considered as also having withdrawn from any protocol and annex to which it is party.

4. Any State Party which withdraws from this Framework shall, before withdrawing, settle its outstanding obligations thereunder.

5. The provisions of this article shall apply to withdrawal from protocols to the Framework.

Article 41

Signature

The present Framework shall be open for signature by all States in whose territory part of the Nile River Basin is situated, from 14th May 2010 to 13th May 2011 at Entebbe, Uganda.

Article 42

Ratification or Accession

The present Framework is subject to ratification or accession by all States in whose territory part of the Nile River Basin is situated. The instruments of ratification or accession shall be deposited with the African Union.

Article 43

Entry into Force

The present Framework shall enter into force on the sixtieth day following the date of the deposit of the sixth instrument of ratification or accession with the African Union.

Article 44

Authentic Texts, Depositary

The original of the present Framework, of which the English and French texts are equally authentic, shall be deposited with the African Union, which shall send certified true copies thereof to the State Parties.

Article 45

Functions of the Depositary

The Depositary shall, in particular, inform the State Parties:

(a) Of the deposit of instruments of ratification or accession, or of any other information, declarations or other instruments provided for in the present Framework.

(b) Of the date of the entry into force of the present Framework.

Annex 1

[Article 14b]: Fact-Finding Commission

1. A Fact-finding Commission shall be established, composed of one member nominated by each State concerned and in addition a member not having the nationality of any of the States concerned chosen by the nominated members who shall serve as Chairman.

2. If the members nominated by the States are unable to agree on a Chairman within three months of the request for the establishment of the Commission, any State concerned may request the Chairperson of the Commission of the African Union (AU) to appoint the Chairman who shall not have the nationality of any of the parties to the dispute or of any of the Nile Basin States concerned. If one of the States fails to nominate a member within three months of the initial request pursuant to paragraph 2 of Article 33 above, any other State concerned may request the Chairperson of the AU Commission to appoint three persons who shall not have the nationality of any of the parties to the dispute or of any of the Nile Basin States concerned.

3. The Commission shall determine its own procedure.

4. The States concerned have the obligation to provide the Commission with such information as it may require and, on request, to permit the Commission to have access to their respective territory and to inspect any facilities, plant, equipment, construction or natural feature relevant for the purpose of its inquiry.

5. The Commission shall adopt its report by a majority vote and shall submit that report to the States concerned setting forth its findings and the reasons therefore and such recommendations as it deems appropriate for an equitable solution of the dispute, which the States concerned shall consider in good faith.

6. The expenses of the Commission shall be borne equally by the States concerned.

[Article 14b]: Attachment

At the end of the negotiations, no consensus was reached on Article 14(b) which reads as follows: “not to significantly affect the water security of any other Nile Basin States”.

All countries [Burundi, DR Congo, Ethiopia, Kenya, Rwanda, Tanzania and Uganda] agreed to this proposal except Egypt and Sudan. To this effect, Egypt proposed that Article 14(b) should be replaced by the following wording:

“not to adversely affect the water security and current uses and rights of any other Nile Basin State”.

The Extraordinary Meeting of the Nile Council of Ministers held in Kinshasa, the Democratic Republic of Congo, on 22 May 2009 resolved that the issue on the Article 14(b) be annexed and resolved by the Nile River Basin Commission within six months of its establishment.

Annexure G

Agreement concerning the River Niger commission and the navigation and transport on the River Niger

The Contracting Parties

Having adopted at the Conference of the Riparian States of the River Niger, its tributaries and sub-tributaries, held at Niamey from the 24th to the 26th October, 1963, an Act regarding the navigation and economic co-operation between the States of the River Niger Basin,

Desirous of giving effect to Article 5 of the said Act, by which they have undertaken to establish an Inter-Governmental Organization entrusted with the fostering, the promotion and the co-ordination of studies and programmes relating to the utilization and development of the resources of the River Niger Basin,

Desirous of specifying some questions relating to navigation and transportation on the River,

Have agreed as follows:

CHAPTER I RIVER NIGER COMMISSION

Article 1

There shall be established an Inter-Governmental Organization as mentioned in Article 5 of the Act of Niamey of October 26, 1963, which shall be called River Niger Commission.

Article 2

The Commission shall have the following functions, in particular:

a) prepare General Regulations which will permit the full application of the principles set forth in the Act of Niamey, and to ensure their effective application.

The General Regulations and other decisions of the Commission shall, after approval by the riparian States and after a time-limit fixed by the Commission, have binding force as regards relations among the States as well as their internal regulation.

b) to maintain liaison between the riparian States in order to ensure the most effective us of the waters and resources of the River Niger basin.

c) to collect, evaluate and disseminate basic data on the whole of the basin, to examine the projects prepared by the riparian States, and to recommend to the Governments of the riparian States plans for common studies and works for the judicious utilization and development of the resources of the basin.

d) to follow the progress of the execution of studies and works in the basin and to keep the riparian States informed, at least once a year thereon, through systematic and periodic reports which each State shall submit to it.

e) to draw up General Regulations regarding all forms of navigation on the River.

f) to draw up staff regulations and to ensure their application.

g) to examine complaints and to promote the settlement of disputes and the resolution of differences.

h) generally, to supervise the implementation of the provisions of the Act of Niamey and the present Agreement.

Article 3

The Commission shall consist of nine Commissioners, one for each riparian State. The Commissioners may be assisted by experts. The Commission shall establish its own Rules of Procedure.

Article 4

The quorum of the Commission shall be six Commissioners. The decisions of the Commission shall be taken by a majority of two-thirds of the Commissioners present and voting.

Article 5

The Commission shall meet in ordinary session once a year. It may meet in extraordinary session at the joint request of any three riparian States by notification addressed to the Administrative Secretary.

The Headquarters of the Commission shall be at Niamey. The meetings of the Commission may take place in the territory of any of the riparian States.

Article 6

The Commission shall have an Administrative Secretary.

The Commission shall, by a two-thirds majority vote, appoint the Administrative Secretary from among the candidates proposed by the riparian States.

Each riparian State shall be entitled to nominate a candidate for the office of Administrative Secretary.

The Administrative Secretary shall hold office for three years and shall be eligible for re-appointment. The conditions of his service shall be defined in the Staff Regulations.

Article 7

The Administrative Secretary shall be assisted in his duties by such staff as the Commission shall determine. The conditions of employment of the Staff shall be defined in the Staff Regulations.

Article 8

The Administrative Secretary shall be in charge of the Staff. He shall exercise such powers and perform such duties as may be determined by the Commission. He shall be responsible to the Commission.

Article 9

The Commission may, by a two-thirds majority vote, remove the Administrative Secretary from office.

Article 10

The riparian States shall make contributions towards the regular Budget of the Commission in the proportions to be determined by the Commission. The Commission shall establish an annual Budget and shall submit it to the riparian States for approval.

Any expenditure incurred in respect of special services rendered to a State by the Commission shall be paid by that State.

Article 11

The Commission shall have for all purposes the status of an international organization. The Commissioners and the Administrative Secretary shall be accorded diplomatic privileges and immunities by the riparian States. The other staff of the Commission shall be accorded such privileges and immunities as are accorded to officials of the Organization of African Unity of equivalent status.

CHAPTER II AGRICULTURAL AND INDUSTRIAL UTILIZATION AND DEVELOPMENT

Article 12

In order to achieve maximum co-operation in connection with the matters mentioned in Article 4 of the Act of Niamey, the riparian States undertake to inform the Commission as provided for in Chapter I of the present Agreement, at the earliest stage, of all studies and works upon which they propose to embark. They undertake further to abstain from carrying out on the portion of the River, its tributaries and sub-tributaries subject to their jurisdiction any works likely to pollute the waters, or any modification likely to affect biological characteristics of its fauna and flora, without adequate notice to, and prior consultation with, the Commission.

CHAPTER III NAVIGATION AND TRANSPORT

Article 13

The taxes and duties payable by the vessels and goods using the River, its tributaries and sub-tributaries, and facilities thereof, shall be in proportion to the services rendered to navigation, and shall in no way be discriminatory.

Article 14

The roads, railways and lateral canals that may be constructed for the special purpose of avoiding the non-navigable portions of the River or of improving certain sections of the waterways, shall be considered in their use as means of communication, as integral part of the River Niger, and shall be equally open to international traffic within the framework of specific regulations set up by the Commission and approved by the riparian States.

On these roads, railways and canals only such tolls shall be collected as are calculated on the cost of construction, maintenance and management. As regards such tolls, the nationals of all States shall be treated on the basis of complete equality.

Article 15

The River Niger Commission shall establish general regulations to ensure the safety and control of navigation on the understanding that such regulations shall be designed to facilitate, as much as possible, the movement of vessels and boats.

CHAPTER IV GENERAL PROVISIONS

Article 16

This Agreement shall form an integral part of the Act of Niamey, and shall enter into force immediately after its ratification by all the signatory States. The instruments of ratification shall be deposited with the Government of the Republic of Niger who shall notify the deposit of these instruments to each riparian State.

Article 17

The Act of Niamey together with this Agreement may be denounced by any one of the riparian States after the expiration of a period of ten years from the date of its coming into force. Denunciation shall take the form of a written notice addressed to the Government of the Republic of Niger who shall acknowledge its receipt and shall inform the other contracting States and the Administrative Secretary of the Commission. It shall take effect one year from the date of acknowledgement of its receipt, if not withdrawn earlier. In the absence of agreement to the contrary it shall not affect obligations relating to any program of studies and works agreed to before such denunciation.

Article 18

The Act of Niamey and this Agreement may be amended upon the written request of one third of the riparian States addressed to the Government of the Republic of Niger. Any proposal for revision shall require the approval of two thirds of the riparian States, and shall take effect six months after the date of its adoption.

Article 19

Upon the coming into force of the present Agreement, the Government of the Republic of Niger shall register it in accordance with Article 102 of the United Nations Charter.

IN WITNESS WHEREOF the plenipotentiaries being duly authorised by their respective Governments have signed the present Agreement.

DONE at Niamey on the 25th day of November, 1964, one copy in English and one in French to be deposited in the archives of the Government of the Republic of Niger and certified copies thereof to be sent to each signatory State, and one copy to be deposited with the Secretariat of the Organization of African Unity and one with the Secretariat of the United Nations.

Federal Republic of Cameroon:

Sanda OUMAROU

Republic of the Ivory Coast:

Souleymane TOURE

Republic of Dahomey:

Francois APLOGAN

Republic of Guinea:

Traoré N'KI

Republic of Upper Volta:

Yacouba BAMBARA

Republic of Mali:

Aliou DEM

Republic of Niger:

Léopold KAZIENDE

Federal Republic of Nigeria:

T.O. ELIAS

Republic of Tchad:

S. SELINGAR

Annexure H

CONVENTION CREATING THE NIGER BASIN AUTHORITY

The President of the People's Republic of Benin;

The President of the United Republic of Cameroon;

The President of the Republic of Ivory Coast;

The President of the Revolutionary People's Republic of Guinea

The President of the Republic of Upper Volta;

The President of the Republic of Mali;

The Chairman of the Supreme Military Council, Head of State of the Republic of Niger;

The President of the Federal Republic of Nigeria;

The President of the Republic of Chad.

Whereas the Act of Niamey relating to the Navigation and the Economic Co-operation between the States of the Niger Basin was signed on the 26th October 1963 at Niamey,

Whereas the Summit of Heads of State and Government met on the 26th January 1979 at Lagos and set up the objectives of dynamising the Organization,

Considering the guiding Speech made by the Current Chairman of the Summit of Heads of State and Government to the 6th Ministerial Session of the River Niger Commission on the 11th March 1980 in Conakry,

Bearing in mind the need to promote the social and economic progress of their countries in order to improve the standard of living of their Peoples,

Convinced that the social and economic progress of their countries calls for an effective economic co-operation based on determined and concerted policy to put together their individual means for the attainment of a collective welfare,

Convinced of the necessity to promote the economic development of their countries through an integrated development of the Niger River Basin,

Reaffirming their willingness for unity and solidarity in the organization for the overall development of the Niger Basin,

Decide to transform the River Niger Commission into a "Niger Basin Authority".

Chapter I CREATION AND COMPOSITION

Article 1

1.By this Convention, the High Contracting Parties decide to change the River Niger Commission to "Niger Basin Authority" hereinafter referred to as "the Authority".

2.The Authority is established in lieu of the River Niger Commission established by the Agreement Relating to the River Niger Commission and to Navigation and Transports on the River Niger, made in Niamey on 25th November 1964, and revised in Niamey on 2nd February 1968 and on 15th June 1973 and in Lagos on 26th January 1979.

3.The Authority inherits all the assets and assumes all the obligations of the River Niger Commission.

4.The Headquarters of the Authority shall be in Niamey, Republic of Niger.

Article 2 COMPOSITION OF THE AUTHORITY

The Riparian States of the Niger River, its tributaries and sub-tributaries, who are signatories of this Convention are members of the Authority and hereafter referred to as "Member States".

Chapter II AIM AND OBJECTIVES OF THE AUTHORITY

Article 3 AIM

1.The aim of the Authority is to promote the co-operation among member States and to ensure an integrated development of the Niger Basin in all fields, by developing its resources particularly in the fields of energy, water resources, agriculture, animal husbandry, fishing and fisheries, forestry and forestry exploitation, transport, communications and industry.

2.In pursuance of the purpose mentioned in the preceding paragraph, the action of the Authority shall be directed to the harmonization of national development policies in the Basin through the implementation of integrated development projects and programmes.

Article 4 OBJECTIVES

1.The Authority shall be responsible for:

(a) The harmonization and the co-ordination of national development policies, in order to ensure an equitable policy as regards sharing of the water resources among member States.

(b) The formulation, in agreement with the member States, of the general policy of the development of the Basin which shall be consistent with the international status of the River Basin.

(c) The elaboration and the execution of an integrated development plan of the Basin.

(d) The initiating and monitoring of an orderly and rational regional policy for the utilization of the surface and underground waters in the Basin.

(e) The designing and conduct of studies, research and surveys.

(f) The formulation of plans, the construction, exploitation and maintenance of structure and projects realized within the general objectives of the integrated development of the Basin.

2.For the purpose set out in the above paragraph (1) the Authority shall notably undertake, in harmony with the development plans of States relating to Niger Basin and in accordance with the general objectives of integrated development of the Basin, the following activities:

(a) Statistics and Planning:

(i)Collection, centralization, standardization, exploitation, dissemination, exchange of technical and related data;

(ii) Co-ordination of plans, projects and research carried out in the member States;

(iii) Consideration of projects presented by the member States with a view to making recommendations on co-ordinated programmes of research and implementation;

(iv) Monitoring of research and works undertaken by member States and subsequent exploitation of reports which such States should submit periodically;

(v)Drawing up a master plan and an integrated development programme of the Basin with an identification, at the various stages of the programme, of priorities among alternative uses, projects and sectors.

(b) Infrastructure:

(i)Designing, study and construction of hydraulic multi- purpose structures of all types and sizes;

(ii) Designing, study and construction of works, plants and projects in the fields of transports and communications;

(iii) Improvement and maintenance of navigable water-ways;

(iv) Development of river transport and promotion of an integrated multi-model transport system (sea-river-rail- road) as a factor of integration and for opening up the land-locked Sahelian member States.

(c) Water Control and Utilization:

(i)Regulation of the flow and drainage of the main waterway;

(ii) Flood control;

(iii) Construction and maintenance of dikes;

(iv) Prevention and control of drought and desertification;

(v)Prevention of soil erosion and sedimentation;

(vi) Setting up of structures and works for land development including salt water and drainage control.

(d) Environment Control and Preservation:

(i)Protection of the environment comprising the establishment of norms and measures applicable to the States in the alternative uses of waters in the Basin;

(ii) Prevention and reduction of water pollution;

(iii) Preservation of human health and genetic resources (fauna and flora).

(e) Navigation Control and Regulation:

The control and the rules of all forms of navigation on the River, its tributaries and sub-tributaries are governed by the principles laid down in the Act of Niamey relating to the Navigation and the Economic Co-operation among the States of the Niger Basin signed at Niamey in 1963.

(f) Land and Agro-Pastoral Development:

(i)Development of food crops;

(ii) Development of agro-pastoral, fishery and forestry resources;

(iii) Implementation of programmes allowing the rational use of waters for domestic, industrial agricultural and pastoral purposes.

(g) Financing the Projects and Works:

Applying for financial and technical assistance on a bilateral, multilateral or international basis for carrying out studies and works for the development of the

Niger River Basin and to that effect conclude agreements, provided that agreements involving financial commitments for the member States become effective only after approval by the Council of Ministers.

3.The terms, conditions and statutory provisions to be defined with the view to achieving the objectives as stated in paragraph (2) above, shall be, if necessary and in each case, provided for in riders which shall be annexed to the Convention of which they shall form an integral part.

4.The member States pledge to keep the Executive Secretariat informed of all projects and works they might intend to carry out in the Basin.

Moreover, they pledge not to undertake any work on the portion of the River, its tributaries and sub-tributaries under their territorial jurisdiction which pollute the waters or modify the biological features of the fauna and the flora.

Chapter III THE INSTITUTIONS OF THE AUTHORITY

Article 5 INSTITUTIONS

1.The institutions of the Authority shall be as follows:

(a) The Summit of Heads of State and Government;

(b) The Council of Ministers;

(c) The Technical Committee of Experts;

(d) The Executive Secretariat and its specialised Organs.

Article 6 THE SUMMIT OF HEADS OF STATE AND GOVERNMENT-COMPOSITION AND FUNCTIONS

1.The Summit of Heads of State and Government hereinafter referred to as "the Summit" is the supreme organ of orientation and decision.

2.The Summit is made up of Heads of State and Government or their duly accredited Representatives.

3.The Summit shall define the general orientation of the development policy of the Authority and ensure the control of its executive functions with a view to achieving its objectives.

4.It shall meet once every two years in ordinary Session in the member State holding the Chairmanship. The quorum shall be the simple majority.

5.The Summit may meet in extraordinary Session at the request of the Current Chairman or a member State on the unanimous agreement of other member States.

6.The decisions and the directives of the Summit shall commit all the Institutions of the Authority.

7.The Summit shall definitely pronounce judgment on any matter which has not been resolved at the level of Council of Ministers.

8.Except otherwise decided, the Summit shall elect a Chairman for two years by rotation among member States according to the French alphabetical order by country. Between two sessions he shall represent the Summit and take decisions within his powers in the interest and for a harmonious operation of the Organization.

Article 7 COUNCIL OF MINISTERS-COMPOSITION AND FUNCTIONS

1.The Council of Ministers of the Authority hereinafter referred to as "the Council" is the organ of control of the Authority. It is made up of Ministers or their accredited representatives. Each member State shall have one vote. Each Minister may be assisted by experts.

2.The Council is responsible for the monitoring of the activities of the Executive Secretariat and shall report them to the Summit. It shall prepare the meetings of the Summit and examine all the problems, deal with matters presented to it and submit the recommendations of these meetings to the Summit.

3.The Council shall meet once a year in ordinary Session. The quorum shall be reached on simple majority. The recommendations and resolutions shall be adopted by consensus.

4.The Current Chairman of the Council shall convene an extraordinary meeting of the Council at the request of a member State.

5.The Council shall meet in the country assuming the chairmanship, or the Host Country, or in any other place designated by the Chairman of the Summit. The Chairman is elected for two years. Between Sessions, he shall represent the Council. He takes decisions according to the directives of the Summit and within the limit of the powers conferred upon him. The Chairmanship is assumed by rotation according to French alphabetical order of the names of the countries.

Article 8 THE TECHNICAL COMMITTEE OF EXPERTS - CREATION, COMPOSITION AND FUNCTIONS

1.The Technical Committee of Experts shall comprise representatives from each member State with the mandate to:

(a) Prepare all meetings of the Council of Ministers;

(b) Submit reports and recommendations to the Council of Ministers.

2.The Technical Committee of Experts may meet at the Executive Secretary's request according to a schedule approved by the Council of Ministers.

3.Any other meeting of the Technical Committee of Experts shall be approved by the Chairman of the Council of Ministers.

Article 9 THE EXECUTIVE SECRETARIAT

1.The Executive Secretariat is the executive organ of the Authority.

2.The Executive Secretariat is run by an Executive Secretary who is appointed, upon recommendation by the Council of Ministers, to the Summit of Heads of State and Government for a period of four (4) years, renewable only once. Each member State has the right to present a candidate for the post of Executive Secretary.

3.The Executive Secretary is the Chief Executive Officer of the Authority. He is assisted by a Deputy Executive Secretary appointed by the Council of Ministers for a term of four (4) years, renewable only once. The Deputy Executive Secretary is under the authority of the Executive Secretary.

4.The Executive Secretary and/or the Deputy Executive Secretary may be removed from office by the Summit on the recommendation of the Council of Ministers.

5.Subject to the overriding importance of securing for the Authority the services of persons possessing the highest qualifications and technical experience due regard shall be paid, on appointing officers to the offices of the Executive Secretariat, to the desirability of maintaining an equitable distribution of appointments to such posts among member States.

6.In the exercise of his duties, the Executive Secretary shall be responsible to the superior organs of the Authority. The Deputy Executive Secretary and the other officials of the Secretariat shall be responsible to the Executive Secretary.

7.The Executive Secretary shall be responsible for the administration of the Authority and all its organs. For this purpose, he shall specifically:

(a) undertake such works and studies with a view to achieving the objectives of the Authority, as may be assigned to him by the Council of Ministers and formulate such proposals as may assist in the harmonious development of the Authority;

(b) negotiate loans and receive gifts on behalf of the Authority with approval by the Council of Ministers.

Chapter IV FINANCIAL PROVISIONS

Article 10 THE BUDGET OF THE AUTHORITY

1.It is established for every year a balanced Budget of the Authority.

2.All the expenses of the Authority, including those relating to the specialized organs of the Executive Secretary, are approved, for each fiscal year, by the Council of Ministers and are imputable to the Budget according to conditions and modalities which are defined in the financial regulations of the Authority.

Article 11 CONTRIBUTIONS OF MEMBER STATES

1.The operating Budget of the Executive Secretary of the Authority shall be financed by contributions equally shared among the member States.

2.The member States pledge to pay regularly their annual contributions to the Budget of the Authority.

Article 12 CURRENCIES OF PAYMENT OF CONTRIBUTIONS

1.The contributions payable by each member State of the Authority under this Convention shall be paid in convertible currency.

2.The Unit of Account in which the Budget of the Authority is established is that of the host country.

3.Are considered as "convertible currencies" under this Article: currencies declared as such by the International Monetary Fund and other currencies which the Council shall consider as such.

4.The exchange rate of the currencies of the member States of the Authority meant for the payments of their contributions under this Convention, shall be the official rate declared to the International Monetary Fund at the date of payment. In case the currency of a member State depreciates, the normal rate of buying and selling of the member State's Central Bank shall be applied.

Article 13 FINANCIAL REGULATION

1.The Council of Ministers shall establish the Financial Regulation with a view to implementing the provisions of this Chapter.

Article 14 THE FINANCIAL CONTROLLER AND THE EXTERNAL AUDITOR

1.A Financial Controller shall be appointed by the Council of Ministers to whom he shall be answerable. He shall be directly responsible as far as the financial management of the Secretariat is concerned.

2.An External Auditor of the Authority is appointed on the recommendation of the host country to the Council of Ministers and may be removed from office, when need be, by the Council.

3.The rules governing the terms and conditions of service of the Financial Controller and the powers of the External Auditor are as laid down in the Financial Regulation.

Chapter V SETTLEMENT OF DISPUTES

Article 15 PROCEDURE FOR THE SETTLEMENT OF DISPUTES

Any dispute that may arise among the member States over the interpretation and/or implementation of this Convention shall be amicably settled through direct negotiation. In the event of failure to settle such disputes, the matter shall be referred to the Summit by a party to such disputes and the decision on the same shall be final.

Chapter VI OTHER PROVISIONS

Article 16 IMMUNITIES; PRIVILEGES AND ADVANTAGES

1.The Authority as an Inter-Governmental Institution shall enjoy legal personality.

2.The Authority shall have in the territory of each member State:

(a) The legal capacity required for the performance of its functions under this Convention;

(b) The power to acquire, enjoy and dispose of movable and immovable property;

(c) The right to institute legal proceedings.

3.In the exercise of its legal capacity under this Article the Authority shall be represented by the Executive Secretary.

4.The Executive Secretary and his Deputy shall be accorded diplomatic privileges and immunities by the member States. The other staff of the Commission shall be accorded such privileges and immunities as accorded to officials of the Organization of African Unity of equivalent status.

Article 17 ENTRY INTO FORCE

The present Convention which is a revision of the Agreement of Niamey and the Riders which shall be annexed and which shall form an integral part of the

Convention upon their signature by member States shall enter into force upon ratification by two thirds of signatory States in accordance with the constitutional procedures applicable in each signatory State.

Article 18 AMENDMENTS AND REVISIONS

1.Any member State may submit proposals for the amendment or revision of this Convention.

2.Any such amendment or revision proposed shall be sent to the Current Chairman of the Council who shall communicate them to other member States not later than 60 days after the receipt of such proposals.

3.All amendments and revisions to this Convention shall enter into force in conformity with the provisions of Article 17.

Article 19 DENUNCIATION

1.Any member State may denounce this Convention after the expiration of ten years (10) as from the date of its entry into force.

2.The denunciation shall be made under the form of notification written to the depositary Government which will in turn acknowledge receipt and communicate it to the Governments of other member States.

3.The denunciation shall take effect one year after the date of its reception unless it has been previously withdrawn. It shall not affect any study programme, works or other commitments already agreed upon before the denunciation, unless there is a previous contrary agreement to this effect.

4.The member State concerned shall meet all obligations under this Convention and by virtue of its status as a member, before the date mentioned in paragraph (3) above.

Article 20 DEPOSITARY GOVERNMENT

The present Convention and all the instruments of ratification and accession shall be deposited with the Government of the Republic of Niger which shall forward certified true copies to all member States and notify them of the date of deposits of the instruments of ratification and accession and shall register this Convention with the Organization of African Unity and the United Nations Organization.

Chapter VII FINAL PROVISION

Article 21 NIAMEY AGREEMENT

This Convention revises the Niamey Agreement, signed in Niamey on the 25th of November 1964 revised in Niamey on the 2nd February 1968 and on the 15th June 1973, and in Lagos on the 26th January 1979.

In witness whereof, we, the Heads of State and Government of Niger Basin Authority, have signed this Convention.

Made at Faranah, this 21st Day of November 1980 in single original in the English and French languages, both texts being equally authentic.

Annexure I

REVISED CONVENTION FOR THE ESTABLISHMENT OF THE NIGER BASIN AUTHORITY

PREAMBLE

The President of the People's Republic of Benin;

The President of the Faso;

The President of the Republic of Cameroon;

The President of the Republic of Côte d'Ivoire;

The President of the Republic of Guinea, Head of State;

The President of the Republic of Mali;

The President of the Supreme Military Council, Head of State of the Republic of Niger;

The President of the Federal Republic of Nigeria;

The President of the Republic of Chad;

HAVING REGARD to the Niamey Act concerning navigation and economic co-operation between the States of the Niger Basin, signed on 20 October 1963,

HAVING REGARD to the Agreement relating to the Niger River Commission and to Navigation and Transport on the Niger River signed at Niamey on 25 February 1964, revised at Niamey on 2 February 1968 and 15 June 1973 and at Lagos on 26 January 1979,

HAVING REGARD to the Convention Establishing the Niger Basin Authority signed on 21 November 1980 in Faranah, Republic of Guinea;

HAVING REGARD TO Decisions Nos. 1, 2 and 3 of the 5th Summit of Heads of State and Government held on 28 October 1987 in Ndjamena, Republic of CHAD,

CONSCIOUS of the need to promote the economic and social progress of their countries with a view to increasing the standard of living of their peoples,

CONVINCED that the economic and social progress of their countries depends on effective economic cooperation based on a determined and concerted policy of combining their particular means for the search for a collective well-

CONVINCED of the need to promote the development of the economies of their countries through the integrated development of the Niger Basin,

REAFFIRMING their desire for unity and solidarity in the organization of the development of the entire Niger basin,

DECIDE to revise the Convention Establishing the Niger Basin Authority signed on 21 November 1980 in Faranah, Republic of Guinea.

FIRST CHAPTER

Creation and Composition

Article 1 - Creation and Headquarters

1. By this Convention, the High Contracting Parties agree to transform the Niger River Commission into a "Niger Basin Authority", hereinafter referred to as "the Authority".

2. The Authority shall be established in place of the Niger River Commission established by the Agreement on the Niger River Commission and Navigation and Transport on the Niger River signed at Niamey on 25 November 1964, revised at Niamey on 2 February 1968 and on 15 June 1973, and in Lagos on 26 January 1979.

3. The Authority shall inherit all assets and shall assume all the obligations of the Niger River Commission.

4. The Headquarters of the Authority shall be in Niamey, Republic of the Niger.

Article 2 - Composition of the Authority

The States bordering on the Niger River, its tributaries and sub-tributaries signatory to this Convention, are members of the Authority and hereinafter referred to as "Member States".

CHAPTER II

Purpose and Objectives of the Authority

Article 3 - Purpose

The aim of the Authority is to promote cooperation between member countries and to ensure the integrated development of the Niger Basin in all areas of energy, hydraulics, agriculture, livestock, Fisheries and fish farming, forestry and logging, transport and communications, and industry.

Article 4 - Objectives

1. For the purposes set out in Article 3, the Authority shall:

(A) to harmonize and co-ordinate national policies for the development of

Water resources of the Niger Basin;

(B) to participate in development planning through the development and implementation of

Implementation of an integrated basin development plan;

(C) to promote and participate in the design and operation of structures and

Projects of common interest;

(D) In accordance with the Niamey Act, to ensure the control and regulation of any

Navigation platform on the river, its tributaries and sub-tributaries;

(E) to participate in the formulation of requests for assistance and the mobilization of

Financing of studies and works necessary for the development of the resources of the Basin.

2. The Authority shall maintain permanent contact with Member States with a view to obtaining information on development plans, in particular in their aspects relevant to the Niger Basin.

3. Member States undertake to inform the Executive Secretariat of all projects and works they propose to undertake in the Basin.

They also undertake to refrain from carrying out on the part of the River, its tributaries and sub-tributaries under its territorial jurisdiction, all works liable to pollute the waters or to modify negatively the biological characteristics of the fauna and Of the flora.

CHAPTER III

Permanent bodies of the Authority

Article 5

The permanent organs of the Authority are the following:

(A) the Summit of Heads of State and Government;

(B) The Council of Ministers;

(C) The Technical Committee of Experts;

(D) The Executive Secretariat.

Article 6 - Summit of Heads of State and Government

1. The Summit of Heads of State and Government of the Authority, hereinafter referred to as "The Summit", shall be the Supreme Governing and Decision Body.

2. The Summit shall be composed of Heads of State and Government or their duly authorized representatives.

3. The Summit shall define the general orientation of the Authority's development policy and shall supervise its executive functions with a view to achieving its objectives.

4. It shall meet once every two years in ordinary session in the Member State holding the presidency. Quorum is reached by a simple majority.

5. The Summit may meet in extraordinary session at the request of the President in Exercise or of a Member State.

6. The decisions and directives of the Summit shall be binding on all the institutions of the Authority.

7. The Summit shall decide definitively on any matter which has not been resolved at the level of the Council of Ministers.

8. Unless it decides otherwise, the Summit shall elect a Chairperson in turn from among the Heads of State and Government of the member countries in alphabetical order of the names of the States in French for a term of office of two years. Between sessions, the President represents the Summit and makes decisions at the level of his or her authority in the interest and for the harmonious functioning of the Organization.

Article 7 - Council of Ministers

1. The Council of Ministers of the Authority, hereinafter referred to as "the Council", shall be the supervisory body of the Authority. It shall consist of Ministers or their duly authorized representatives on the basis of one vote per Member State. Each Minister may be assisted by experts.

2. The Council is responsible for the follow-up of the activities of the Executive Secretariat, which it reports to the Summit. It ensures the preparation of Summit sessions, discusses all issues, addresses the issues that come before it, and makes recommendations to the Summit.

3. The Council shall meet once a year in ordinary session. Quorum is reached by a simple majority. Recommendations and resolutions are adopted by consensus.

4. The President-in-Office of the Council shall convene an extraordinary meeting of the Council at the request of any Member State.

5. The Council shall meet in the countries holding the Presidency in Exercise, failing that in the country of Headquarters or in any other place indicated by the President of the Summit. The term of office of the President shall be two years. Between sessions, he represents the Council.

6. It shall take decisions in accordance with the Summit's guidelines and within the limits of the powers delegated to it. The presidency shall be held alternately in alphabetical order of the names of the States in French.

Article 8 - The Technical Committee of Experts

1. The Technical Committee of Experts shall be composed of representatives of Member States. Its mandate is to:

(A) to prepare the sessions of the Council of Ministers;

(B) to submit reports and recommendations to the Council of Ministers.

2. The Technical Committee of Experts shall be convened by the Executive Secretary in accordance with a schedule approved by the Council of Ministers.

3. Any other meeting of the Technical Committee of Experts shall obtain the approval of the President of the Council of Ministers.

Article 9 - The Executive Secretariat

1. The Executive Secretariat shall be the Executing Agency of the Authority.

2. It shall be headed by an Executive Secretary who shall be appointed on the recommendation of the Council of Ministers by the Summit of Heads of State and Government for a period of four years, renewable once. Each Member State may nominate a candidate for the post of Executive Secretary.

3. The Executive Secretary shall be the chief official of the Executive Secretariat of the Authority.

4. The Executive Secretary shall be relieved of his duties by the Summit on the recommendation of the Council of Ministers.

5. In appointing officials to the various posts of the Executive Secretariat, account shall be taken of the qualification and the need to maintain an equitable distribution of posts between Member States.

6. In exercising his functions, the Executive Secretary shall be responsible to the highest authorities of the Authority. The other officials of the Secretariat are responsible to the Executive Secretary.

7. The Executive Secretary shall be responsible for the administration of the Authority and all its structures for the implementation of decisions taken by the Higher Authorities.

To this end, it shall in particular be responsible for:

(A) undertake all work and studies with a view to achieving the objectives of

The Authority.

(B) to formulate any proposals likely to contribute to the harmonious development

of the authority.

CHAPTER IV

Financial provisions

Article 10 - Authority budget

1. An annual budget of the Revenue and Expenditure Authority shall be established.

2. The Authority's operating budget shall be financed from the contributions of the Member States determined in an equitable manner.

3. All expenditure of the Authority, including those relating to the specialized organs of the Executive Secretariat, shall be approved for each financial year by the Council of Ministers and shall be charged to the budget, the terms and conditions of which are laid down in the budget. Financial regulation of the Authority.

4. Member States undertake to pay their annual contributions regularly to the budget of the Authority.

Article 11 - Currency of payment of contributions

1. The contribution to be borne by a Member State of the Authority under this Convention shall be settled in convertible currency.

2. The unit of account in which the budget of the Authority is established shall be that of the country of the Headquarters.

3. For the purposes of this Article, currencies declared as such by the International Monetary Fund and such other currencies as the Council may also designate as such, shall be deemed to be "Convertible Currencies".

4. The exchange rates of the currencies of the Member States of the Authority for the payment of contributions to be borne by them under this Convention shall be the official rate declared to the International Monetary Fund on the date of payment. In the case where the currency of a Member State is floating, the base average of the rates of sale and purchase of the Central Bank of the Member State shall be used.

Article 12 - Financial Regulation

The Council of Ministers shall draw up the Financial Regulations for the application of the provisions of this Chapter.

Article 13 - Management Control Committee and Financial Controller

1. A Management Control Committee composed of two Finance Inspectors appointed for 2 years by 2 Member States in a rotating manner, in alphabetical order in French, shall verify the accounts of the Executive Secretariat at the end of each financial year.

2. A Financial Controller is appointed by and directly dependent on the Council of Ministers. It reports to the Council on the financial management of the Secretariat.

3. The functions of the Financial Controller and the powers of the Management Control Committee shall be determined by the Financial Regulations.

CHAPTER V

Staff Status

Article 14

The Council of Ministers shall draw up the regulations applicable to the personnel of the Niger Basin Authority.

CHAPTER VI

Legal personality, privilege and immunity

Article 15

Juridic people;

1. The Authority, as an Intergovernmental Organization shall have legal personality and the necessary capacity:

- contracting;

- to acquire the movable and immovable property essential for the realization of its

Objectives;

- to institute legal proceedings;

- borrowing;

- accept gifts and bequests.

2. In exercising its rights as defined in this Article, the Authority shall be represented by the Executive Secretary within the limits of the powers and decisions given by the Council of Ministers.

Article 16 - Privileges and immunities

(1) The privileges and immunities granted to the Executive Secretary of the Niger Basin Authority shall be the same as those enjoyed by the heads of diplomatic missions in the country in which the Authority has its seat and in the Member States.

(2) The privileges and immunities accorded to officials of the Niger Basin Authority shall be the same as those enjoyed by officials of diplomatic missions in the country in which the Authority has its seat and in the Member States.

CHAPTER VII

Miscellaneous

Article 17 - Amendments and Revisions

1. Any Member State may submit proposals for the amendment or revision of this Convention.

2. All proposals for amendment or revision shall be sent to the President of the Council, who shall communicate them to the Member States not later than sixty days after their receipt.

3. Any amendment or revision of this Convention shall enter into force on the same conditions as the Convention itself.

Article 18 - Denunciation

1. Any Member State may denounce this Convention after the expiration of ten (10) years from the date of its entry into force.

2. The denunciation shall be made in the form of a written notification addressed to the Depositary Government which shall acknowledge receipt thereof and shall inform the Governments of the other Member States accordingly.

3. The denunciation shall take effect one year after the date of receipt, unless withdrawn beforehand. It shall not prejudice, unless otherwise agreed, commitments relating to a program of studies, works or other undertakings which have been the subject of an agreement before the denunciation.

4. The Member State shall be bound to fulfill all its obligations under this Convention and arising out of its membership before the effective date of the denunciation.

Article 19 - Depositary Government

This Convention and all instruments of ratification and accession shall be deposited with the Government of the Republic of Niger, which shall transmit certified copies thereof to all Member States, shall notify them of the date of deposit of the instruments of ratification and accession And shall register this Convention with the Organization of African Unity and the United Nations.

Article 20 - Settlement of Disputes

Any dispute which may arise between Member States in the interpretation or application of this Convention shall be settled amicably by direct negotiation.Failing that, the dispute shall be referred by one of the parties to the Summit, which shall act as a last resort.

Article 21 - Entry into force

This Convention which revises and replaces the Convention signed at Faranah on 21 November 1980 shall enter into force upon ratification by two thirds of the signatory Member States.

DONE at Ndjamena on 29 October 1987 in a single original in the English and French languages, both texts being equally authentic.

For the President of the People's Republic of Benin His Excellency SOULEY DANKORO Minister of Equipment and Transport For the President of FASO For the President of the Republic of Cameroon His Excellency SADOU HAYATOU Minister for Planning and Regional Development President of the Republic of Côte d'Ivoire For the President of the Republic of Guinea His Excellency JEAN TRAORE Minister for Foreign Affairs For the President of the Republic of Mali His Excellency General MOUSSA TRAORE For the Republic of Niger His Excellency HAMID AIGABID Prime Minister For the President of the Federal Republic of Nigeria His Excellency Major General MG NASCO Minister of Agriculture, Water Resources and Rural Development For the President of the Republic of Chad His Excellency EL HADJ HISSEIN HABRE

BIBLIOGRAPHY

Abdi, O.A., Glover, E.K and Luukkanen, 2013. 'Causes and impacts of land degradation and desertification: Case study of the Sudan', *International Journal of Agriculture and Forestry*, Vol. 3, No. 2.

Abebe, L., 2009. 'Natural resource conflicts in West Africa: The case of the RNB', in D.W. Tadese (ed.), *Climate change and transboundary water resource conflict in Africa*, Institute for Security Studies (ISS) Workshop report, Mombasa.

Abseno, M.M., 2013. 'Nile River Basin', in F.R. Loures and A. Rieu-Clarke (eds), *The UN Watercourses Convention in Force: Strengthening International Law for Transboundary Water Management*, 28 August, Routledge.

Adar, K.G., 2007. 'Kenya's foreign policy and geopolitical interest: The case of the Nile River Basin', *African Sociological Review*, Vol 11, no.1.

Adar, K.G., 2011. 'Kenya's foreign-policy and geopolitical interests: The case of the Nile River Basin, in K.G. Adar and N.A. Check (eds), *Cooperative Diplomacy, Regional Stability and National Interests: The Nile River and the Riparian States*, Pretoria: Africa Institute of South Africa.

Adar, K.G. and Check, N.A., 2011. *Cooperative Diplomacy, Regional Stability and National Interest: The Nile River and Riparian States*, Pretoria: African Institute of South Africa.

Afedraru, L., 2014. 'Uganda's energy sector grows despite challenges', *Daily Monitor*, 26 November, http://mobile.monitor.co.ug/Business/technology/Uganda-s-energy-sector--grows-despite-challenges/-/2471068/2535688/-/format/xhtml/-/13yla7j/-/index.html, accessed: 04 April 2015.

African Union (AU), 2000. 'The Africa Water Vision 2025: Equitable and sustainable use of water for socioeconomic development', *Africa Water Vision 2025*, UN Water/Africa.

African Union, 2003. *African Convention on the Conservation of Nature and Natural Resources*, 1968, CAB/LEG/24.1.

African Union, 2008. 'Statement by H.E. Professor Alpha Oumar Konare Chairperson of the commission of the African Union', *The occasion of the six anniversary of Africa environment day*, Addis Ababa, 3 March 2008.

Ahmed, F., 2011. 'Key social vulnerabilities to climate change in South Africa's coastal zones: The potential for conflict', in V. Gounden (ed.), *Environment, Climate Change and Conflict*, Conflict Trends, Issue 2.

Aich V., Koné B., Hattermann, F., and Paton, E., 2016. 'Time series analysis of floods across the RNB', *Water,* Vol. 8, No. 165.

Al-Ahram weekly, 2015. 'Questions about the CFA', 22 April, http://weekly.ahram.org.eg/News/11030/17/Questions-about-the-CFA-.aspx, accessed: 19 January 2017.

Alcamo, J., Hulme, M., Conway, D., and Krol, M., 1996. 'Future availability of water in Egypt: The interaction of global, regional and basin scale driving forces in the Nile basin', *AMBIO – A Journal of the Human Environment*, Vol. 25, No. 5.

Al-Din Amer, S., 1997. 'The law of water: Historical record', in B. Dupuy (ed.), *Aspects économiques de la gestion de l'eaudans le bassinméditerranéen*, Bari: Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM), Options Méditerranéennes: Série A, Séminaires Méditerranéens, n . 31.

Al Jazeera, 2013. 'African Union seeks financial independence', 24 May, www.aljazeera.com/news/africa/2013/05/201352412928567270.html, accessed: 21 August 2014.

Al-Labbad, M., 2013. 'Egypt, Ethiopia headed for War over Water', *Al-Monitor*, 24 March, www.al-monitor.com/pulse/political/2013/03/egypt-ethiopia-water-war.html, accessed: 14 May 2013.

Allan, A.J., 1999. 'The Nile Basin: Evolving approaches to Nile waters management', *SOAS Water Issues Group*, Occasional Paper 20, June, United Kingdom: University of London.

Amadou, A., Abdouramane, G.D., Ousmane, S., Ibrah, S.S., and Sittichok, K., 2014. 'Changes to flow regime on the RNB at Koulikoro under a changing climate', *Hydrological Sciences Journal*.

Andersen, I., Dione, O., Jarosewich-Holder, M., and Olivry, J., 2005. *The RNB: A vision for sustainable management*, Washington, DC: The International Bank for Reconstruction and Development / the World Bank.

Arnold, D., 2013. 'Nile Power Shifts Away From Egypt', *VOA.news*, 15 July, http://www.voanews.com/content/nile-power-shifts-away-from-egypt/1702289.html, accessed: 17 February 2015.

Arsano, Y. 2007. Ethiopia and the Nile. Dilemmas of National and Regional Hydropolitics. Center for Security Studies, Swiss Federal Institute of Technology, Zurich ETH Zentrum SEI, Seilergraben 49.

Ashton, P. 2000.Southern African Water Conflicts: Are they inevitable or preventable? In*Water for peace in the Middle East and Southern Africa*.Green Cross International. Geneva.

Ashton, P. J., 2002. 'Avoiding conflict over Africa's resources', *AMBIO - A Journal of the Human Environment*, Vol. 31, No. 3. Royal Swedish Academy of Sciences

Axelrod, R and Keohane, R.O. 1985. Achieving Cooperation under Anarchy: Strategies and Institutions. *World Politics*, Vol. 38, No. 1. October. The Johns Hopkins University Press

Ayad, A.R., 2013. 'Water quality in Cairo, is it safe?', *Cairo from Below*: *Information and debate on the urban future of Cairo*, 5th February, http://cairofrombelow.org/2013/02/05/water-quality-and-cairo-is-it-safe/, accessed: 18 January 2014.

Ayeb, H., 2013. 'Egypt no longer owns the Nile', *Le Monde Diplomatique*, 4 August, http://mondediplo.com/2013/08/04nile, accessed: 04 April 2015.

Ayibotele, N.B., 2008. *West Africa – IWRM in the RNB*, Case #46, Accra.

Ayuba, H., 2016. 'Environmental risks and developmental challenges confronting river Niger and its basin', *Paper presented at the 8th African Organization of Supreme Audit Institutions Working Group on Environmental Auditing (Afrosai-WGEA) annual meeting*, 12−16 September, Abuja.

Baecher, G., Anderson, R., Britton, B., Brooks, K., and Gaudet, J. 2000. 'The Nile Basin: Environmental transboundary opportunities and constraints analysis', *United States Agency for International Development Draft Paper*, October.

Baechler, G., 1998. 'Why environmental transformation causes violence: a synthesis', *Environmental change and security,* Project report 4.

Balleh, A., 2014. 'Nile Basin Initiative: Has it delivered on its promises?' *Horn Affairs*, 11 September, http://hornaffairs.com/en/2014/09/11/nile-basin-initiative-nbi-has-it-delivered-on-its-promises/, accessed: 12 November 2014.

Barnett, J., 2000. 'Destabilizing the environment – Conflict thesis', *Review of International Studies***,** Vol. 26, No. 2**,** April, Cambridge University Press.

Barnett, J., and Adger, W.N., 2007. 'Climate change, human security and violent conflict', *Political Geography*, 26.

BBC World News, 1998. 'Lesotho and its big brother', 22 September, http://news.bbc.co.uk/1/hi/world/africa/177389.stm, accessed: 09 March 2016.

BBC News, 2010. 'Web campaign against Ethiopia Gibe III dam', 23 March, http://news.bbc.co.uk/2/hi/africa/8582682.stm, accessed: 20 March 2015.

Beck, L. and Bernauer, T., 2010. *Water scenarios for the Zambezi River Basin, 2000 -2050*, 1 June, ETH Zurich: Center for Comparative and International Studies and Center for Environmental Decisions.

Benjaminsen, T. A, 2008. Does Supply-induced scarcity drive violent conflicts in the African Sahel? The case of the Taureg Rebellion in Northern Mali.*Journal of Peace Research*, Vol. 45, No. 6.

Bennett, O., 2012. 'The human cost of displacement', *Panos London*, 14 May. http://panoslondon.panosnetwork.org/countries/lesotho/, accessed: 12 October 2016.

Benvenisti, E.W., 1996. 'Collective action in the utilization of shared freshwaters: The challenges of international water resources law', *American Journal of International Law*, Vol. 90.

Bernauer, T., 2002. 'Explaining success and failure in international river management', *Aquatic Sciences*, Vol.64, No.1.

Bigagaza, J., Abong, C. and Mukarubuga, C., 2002. 'Land scarcity, distribution and conflict in Rwanda', in J. Lind and K. Sturman (eds), *Scarcity and Surfeit: The ecology of Africa's conflicts*, Nairobi and Pretoria: African Centre for Technology Studies Press and Institute for Security Studies.

Bingham, K., 2001. 'Environmental scarcity and the outbreak of conflict', *Population Reference Bureau Inform* (PRB), January, www.prb.org/Publications/Articles/2001/EnvironmentalScarcityandtheOutbreakofConflict.aspx, accessed: 29 December 2013.

Binningsbø, H.M., de Soysa, I and Gleditsch, N.P. 2007 Green giant or straw man? Environmental pressure and civil conflict, 1961–99. Population Environment, 28.

Bischoff, P., 2003. 'External and domestic sources of foreign policy ambiguity: South African foreign policy and the projection of pluralist middle power', *Politikon*, Vol. 30, No.2, November.

Blumstein, S., 2016. 'Calming the waters: Why we need to better integrate climate and water policy', *New Security Beat*, 23 August, www.newsecuritybeat.org/2016/08/calming-waters-integrate-climate-water-policy/, accessed: 01 March 2017.

Boadu, F.O., 1998. 'Relational characteristics of transboundary water treaties: Lesotho's water transfer treaty with the Republic of South Africa', *Natural Resources Journal*, no. 38.

Bond, P., Ruiters, G. and Stein, R., 2002. 'Droughts and floods: Water prices and values in the time of cholera', in P. Bond (ed.), *Unsustainable South Africa: Environment, development and social protest*, Scottsville, South Africa: University of Natal Press.

Bosshard, P., 2009. 'China dams the world', *World Policy Journal,* Vol. 26, No. 4, World Policy Institute, Winter.

Bosshard, P. 2015. Chinese Dams in Africa.*International Rivers*.http://www.internationalrivers.org/campaigns/chinese-dams-in-africa. Accessed: 06-03-2015.

Braune, E and Xu, Y., 2010. 'The role of ground water in sub-Saharan Africa', *Ground Water Issue/Paper*, Vol. 48, No. 2. March.

Brels, S., Coates, D., and Loures, F., 2008. 'Transboundary water resources management: the role of international watercourse agreements in implementation of the CBD', *Secretariat of the CBD Technical Series*, No. 40, Montreal: Convention on Biological Diversity.

Brewer, N., 2008. 'The new great walls: A guide to China's overseas dam industry', *International Rivers*, July.

Bronkhorst, S., 2011. 'Addressing climate-related conflict: Human security and lessons from the southern Sahelian belt of Sudan', in V. Gounden (ed.), *Environment, Climate Change and Conflict*, Conflict Trends, Issue 2.

Brouwer, C., Prins, K., Kay, M. and Heibloem, M., 2001. 'Irrigation water management: Irrigation methods', *Training manual* no. 5, FAO Land and Water Development Division.

Brown-Weiss, E. and Jacobson, H.K., 1998. *Engaging Countries: Strengthening Compliance with International Environmental Accords*, Cambridge, Mass: MIT Press.

Brummer, S. and Gilmore, I., 2000. 'SA's Lesotho massacre 'cover up'', *Mail & Guardian,* 17 March, http://allafrica.com/stories/200003170187.html, accessed: 09 February 2016.

Brundtland, G.H., 1987. *Our common future*, Oxford, Oxford University Press.

Bujra, A. 2002. African Conflicts: their Causes and their Political and Social Environment. *Development Policy Management Forum (DPMF) Occasional Paper*, No. 4. Addis Ababa.

Burnett, P., 2009. 'Southern Africa: Neglected land washing away', *Inter Press Service*, 30 September, www.ipsnews.net/2009/09/southern-africa-neglected-land-washing-away/, accessed: 11 August 2016.

Cabot, C. 2017. Climate change, security risks and conflict reduction in Africa: a case study of farmer-herder conflicts over natural resources in Cote d'Ivoire, Ghana and Burkina Faso 1960-2000. Berlin.

Cambanis, T., 2010. 'Egypt and thirsty neighbors are at odd over Nile', *The New York Times*, 25 September, www.nytimes.com/2010/09/26/world/middleeast/26nile.html?pagewanted=all&_r=0, accessed: 06 February 2013.

Caponera, D., 1993. 'Legal aspects of transboundary river basins in the Middle East: The Al Asi (Orontes), the Jordan and the Nile', *Journal of Natural Resources*, 33.

Carius, A and Imbusch, K., 1999. 'Environment and security in international politics: An introduction', in A. Carius and M. Kurt (eds), *Environmental Change and Security: A European Perspective*, Lietzmann, Berlin etc: Springer.

Carroll, C., 1999. 'Past and future legal framework of the Nile River Basin', *Georgetown International Environmental Law Review* 12.

Cascão, A.E., 2009. 'Changing power relations in the Nile river basin: Unilateralism vs. cooperation?' *Water Alternatives,* Vol. 2, No. 2.

Center for Climate and Energy solutions, 2007. *National security and the threat of climate change: military advisory board findings*, www.c2es.org/science-impacts/national-security/military-advisory-board-summary, accessed: 10 March 2016.

Centre for Ecology and Hydrology, 2017. *RNB*, www.waterandclimatechange.eu/river-basin/niger, accessed: 01 February 2017.

Chesire, K.D., 2010. *Control over the Nile: Implications across Nations*, Monterey, California: Naval Postgraduate School.

Coetzee, W.S. 2012. The role of the environment in conflict: complex realities in post-civil war Nigeria. *Thesis presented in partial fulfilment of the requirement for the degree Master of Arts (International Studies).* University of Stellenbosch.

Collier, D. 2011. Understanding Process Tracing. *Political science and Politics, Vol.44, No.4.* October.

Conca, K., Ehrlich, A.H. and Gleick, P., 2000. 'Conflict over resources', *Draft Background Paper for Working Group 5: Resources and Environmental Degradation as Sources of Conflict*, (50th Pugwash Conference on Science and World Affairs: Eliminating the Cause of War), Queens' College, Cambridge, UK, 3−8 August.

Conley, A.H and Van Niekerk, P.H., 2000. *Sustainable management of international waters: The Orange River case*, Water Policy 2.

Conniff, R. 2017. The Vanishing Nile: A Great River Faces a Multitude of Threats. *Yale Environment 360*, 6th April. http://e360.yale.edu/features/vanishing-nile-a-great-river-faces-a-multitude-of-threats-egypt-dam. Accessed: 16-05-2017.

Conteh-Morgan, E. 2004. Collective political violence: an introduction to the theories and cases of violent conflict. Routledge. New York.

Conway, D., Persechino, A., Ardoin-bardin, S., Hamandawana, H., Dieulin, C. and Mahe, G., 2009. 'Rainfall and water resources variability in sub-Saharan Africa during the twentieth century', *Journal of Hydrometeorology*, Vol.10.

Country Meters, 2016. *Lesotho Population 2016*, http://countrymeters.info/en/Lesotho, accessed: 12 October 2016.

Cowger, A.R., 1985. 'Rights and obligations of successor states: An alternative theory', *Case Western Reserve Journal of International Law*, Vol. 17, Issue 2.

Dakkak, A., 2013. 'Egypt's water crisis – Recipe for disaster' .*EcoMENA: Echoing sustainability*, 30 March, www.ecomena.org/egypt-water/, accessed: 18 January 2014.

Degefu, G., 2003. *The Nile: historical, legal and developmental perspectives*, Victoria, Canada: Trafford Publishing.

Delbourg, E., and Strobl, E., 2012. *Cooperation and conflict between upstream and downstream countries in African transboundary rivers*, France: Ecole Polytechnique, 1 June.

Deligiannis, T. 2010. The evolution of environment-conflict research. In Critical Environmental security: rethinking the links between natural resources and political violence. Schnurr, M.A and Swatuk, L. A (eds.). New Issue in Security, No. 5. Centre for Foreign Policy Studies. Dalhousie University.

Demeke, M.A., 2013. 'Why Ethiopia rejected the validity of the 1929 and 1959 Agreements regarding the Nile River', *The Reporter*, 22 June, www.thereporterethiopia.com/index.php/opinion/commentary/item/627-why-130ethiopia-rejected-the-validity-of-the-1929-and-1959-agreements-regarding-the-nile-river, accessed: 12 September 2014.

Deng, B.K., 2007. 'Cooperation between Egypt and Sudan over the Nile River waters: The challenges of duality', *African Sociological Review* 11, no 1.

Department of Water and Sanitation (DWS), 2014, 'Business case for the Vaal River Catchment Management Agency', *Business case for the establishment of the Vaal River CMA*, August.

Department of Water and Sanitation, 2015, 'ORASECOM undertakes the second Joint Basin Survey', *Media Statement*, 23 July, www.dwa.gov.za/Communications/PressReleases/2015/Media%20Statement-ORASECOM.pdf, accessed: 11 August 2016.

Department of Water and Sanitation, 2016, *Water resources of the Orange River*, www.dwa.gov.za/orange/waterres.aspx, accessed: 20 October 2016.

Desta, H., 2012. 'Overview on degradation of land due to overgrazing in Ethiopia', *Dipartimento di Scienze e Tecnologie Veterinarie per la Sicurezza Alimentare,* UniversitàdegliStudi di Milano.

Deudney, D. 1990. The case against linking environmental degradation and national security. *Millennium: Journal of International Studies, Vol. 19, No.3.*

Di Nunzio, J., 2013. 'Conflict on the Nile: the future of transboundary water disputes over the world's longest river', *Strategic Analysis Paper*, Future Directions International.

Diamond, K., 2011. 'Climate change, water, and conflict in the RNB', *New Security Beat*, 13 December, www.newsecuritybeat.org/2011/12/climate-change-uncertainty-and-conflict-in-the-niger-river-basin/, accessed: 20 February 2017.

Diarra, S.T., 2011. 'West Africa: RNB under pressure from dams', *Inter Press Service (IPS)*, 31 October, www.ipsnews.net/2011/10/west-africa-niger-river-under-pressure-from-dams/, accessed: 23 February 2017.

Diederichs, N., O'Regan, D., Sullivan, C., Fry, M., Mander, M., Haines, C. and McKenzie, M., 2005. *Orange River Basin Baseline Assessment report*, NeWater.

Diehl, P.F. 1991. Geography and War: a review and assessment of the empirical literature. *International Interactions*, Vol. 17.No. 1.

Diehl, P.F and Gleditsch, N.P. 2001. *Environmental Conflict: An Anthology*. Boulder, CO: Westview Press.Dieperink, C., 1998. *From open sewer to salmon run: Lessons from the Rhine water quality regime*, Water policy 1.

Djiré, M., Cissé, A.O., Cold-Ravnkilde, S.M., Keita, A. and Traore, A. (2010). Conflict and cooperation in local water governance – inventory of local water-related events in Douentza District, Mali, DIIS Working Paper 2010:12. Copenhagen, Denmark: Danish Institute for International Studies.

Domhoff, G.W., 2006. 'The limitations of regime theory', *City and Community*, Vol.5, No.1, March, University of California.

Dong, S., Wen, L., Liu, S., Zhang, X., Lassoie, J.P., Yi, S,. Li, X., Li, J. and Li, Y. 2011. Vulnerability of worldwide pastoralism to global changes and interdisciplinary strategies for sustainable pastoralism. Ecology and Society, No.16, Vol.2.

Dunoff, J.L., and Trachtman, J.P., 1999. 'Economic Analysis of International Law', *Yale Journal of International Law* 1, Philadelphia.

Du Plessis, A., 2000. 'Charting the course of the water discourse through the fog of international relations theory', in H. Solomon and A. Turton (eds), *Water Wars: Enduring Myth or impending reality*, African Dialogue, Monograph**,** Series 2, KwaZulu Natal: ACCORD.

Dupont, A. 1998. *The Environment and Security in Pacific Asia*, International Institute for Strategic Studies, Adelphi Paper 319, June 1998

Earle, A., 2005. 'Hydropolitics in Southern Africa: What is the prognosis for peaceful development of shared watercourses?', *FWU*, Vol.3, Topics of integrated Watershed Management – Proceedings, Summer School.

Earle, A., Malzbender, D., Turton, A., and Manzungu, E., 2005. 'A preliminary basin profile of the Orange/Senqu River', *The Inwent Capacity Development Programme: Integrated Water Resources Management in Shared River Basins in the SADC Region*, April. Cape Town.

El-Fadel, M., El-Sayegh, Y., El-Fadl, K., and Khorbotly, D., 2003. 'The Nile River Basin: A case study in surface water conflict resolution', *Journal for Natural Resource Life Science Education*, Vol. 32, Madison, USA.

Elhance A. 2000. 'Hydropolitics: Grounds for despair, reasons for hope', *International Negotiation*, Vol.5, No.2.

El-Hinnawi, E. 1984. *Environmental Refugees*, Nairobi, Kenya: UN Environmental.

Elmi, A., 2002. 'Hydropolitics in the horn of Africa: Conflicts and cooperation in the Juba & Shabelle Rivers', *Paper presented at the Horn of African Conference*, 10-12 May, www.somwe.com/hydropolitics.html, accessed: 17 March 2016.

Emanuelli, C., 2003. 'State succession, Then and now, with special reference to the Louisiana Purchase (1803)', *Louisiana Law Review*, Vol. 63, No. 4.

Erdal, Z., 2013. 'Strengthening new bonds: China's investments' role in boosting Ethiopia industrialisation', *Consultancy Africa*, 4 February, www.consultancyafrica.com/index.php?option=com_content&view=article&id=1209:strengthening-new-bonds-chinese-investments-role-in-boosting-ethiopian-industrialisation-&catid=87:african-finance-a-economy&Itemid=294, accessed: 16 March 2015.

Eriksson, M. and Zetterland, K., 2013. 'Dealing with change: EU and AU responses to the Tunisia, Egypt and Libya', *FOI*, January.

Fanowedy, S., 2013. 'The Nile River: Obsolete riddles vs. the new opportunities', *Tigrai Online*, 26 June, www.tigraionline.com/articles/neo-nile-opportunity.html, accessed: 22 April 2014.

Food and Agriculture Organization of the United Nations (FAO), 1997. Irrigation potential in Africa: A basin approach. *FAO Land and Water Bulletin 4.* http://www.fao.org/docrep/W4347E/w4347e0i.htm.. Accessed: 16-05-2017.

Food and Agriculture Organization of the United Nations (FAO), 2002. *Africa region – Reversing land and water degradation trends in the RNB*, UNDP: World Bank.

Food and Agriculture Organization of the United Nations (FAO), 2011. 'Information products for Nile Basin water resources management', *Nile Basin Project Synthesis Report*, Rome.

Ferar, K., 2010. *Nile water: Development, environment and conflict*, In partial fulfilment of a Bachelor of Arts Degree in Environmental Analysis and Peace, Conflict and Development, Pitzer College, Claremont, California.

Few, R., Satyal, P., McGahey, D., Leavy, J., Budds, J., Assen, M., Camfield, L., Loubser, D., Adnew, M. and Bewket, W., 2015, 'Vulnerability and adaptation to climate change in semi-arid areas in East Africa', *ASSAR Working Paper*, ASSAR PMU, South Africa.

Foulds, K., 2002. *The Nile Basin Initiative: Challenges to implementation*, Paper presented at the Managing Shared Water Conference, 23-28 June 2002. Hamilton, Ontario. Canada.

Friedrich, J. 2014. Who's afraid of Thomas Malthus? In Manfredo, M. J., Vaske, J. J., Rechkemmer, A and Duke, E. A (eds.). Understanding Society and Natural Resources: Forging New Strands of Integration Across the Social Science. New York.

Furlong, K., 2006. 'Hidden theories, troubled waters: International relations, the 'territorial trap', and the Southern African Development Community's transboundary waters', *Political Geography 25*, University of British Colombia.

Gao, Y., 2010. *Transboundary Water Governance in the Volta River Basin*. https://wikis.uit.tufts.edu/confluence/display/aquapedia/Transboundary+Water+Governance+in+the+Volta+River+Basin, accessed: 23 February 2017.

Garretson, A.H., 1960. *The Nile River System*. Proceedings of the American Society of International Law 54. Washington D.C.

GeeskaAfrika Online, 2015. *Ethiopia: Global Dam's water transfer not enough for security*, www.geeskaafrika.com/ethiopia-global-dams-water-transfers-not-enough-for-security/7659/, accessed: 20 March 2015.

Gendron, R. and Hoffman, E., 2009. 'Resource scarcity and the prevention of violent conflicts', *Peace & Conflict Review*, Volume 4, Issue 1.

George, B.H. and Cowie, A.C., 2011. 'Bioenergy systems, soil, health and climate change', in B.P. Sign, A.L. Cowie and K.Y. Chan (eds), *Soil, Health and Climate Change*, New York.

German Environment Ministry, 2002. *Climate Change and Conflict: Can climate change impacts increase conflict potentials? What is the relevance of this issue for the international process on climate change?*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin.

Gilpin, R., 1981. *War and Change in World Politics*, Cambridge: Cambridge University Press.

Gleditsch, N.P. 1997. Environmental Conflict and the Democratic Peace. International Peace Research Institute, Oslo. Kluwer Academic Publishers.

Gleditsch, N. P. 1998. Armed Conflict and the Environment: A Critique of the Literature. *Journal of Peace Research, Vol. 35, no. 3.*

Gleditsch, N P., Furlog, K., Hegre, H., Lacina, B., and Owen, T., 2006. 'Conflicts over shared rivers: Resource scarcity or fuzzy boundaries?', *Political Geography* 25, Elsevier Ltd.

Gleick, P. 1989. 'Climate Change and International Politics: Problems Facing Developing Countries'. *Ambio*, Vol. 18, No. 6.

Gleick, P.H. 1993. 'Water and conflict: Fresh water resources and international security', *International Security*, Vol. 18, No. 1, Summer.

Godana, B.A., 1985. *Africa's Shared Water Resources*, London: Fances Pinter, Boulder, Colorado: Lynne Rienner Publishers.

Gould, M. and Zobrist, F., 1989. 'An overview of water resources planning in West Africa', *World Development*, Vol. 17, No. 11.

Goulden, M. and Few, R., 2011. *Climate Change, Water and Conflict in the RNB*, USAID, December.

Grainger, S. and Conway, D., 2014, 'Climate change and international river boundaries: Fixed points in shifting sands', *WIREs Climate Change*, Vol.5, November/December.

Green Prophet, 2010. *Upstream African Countries sign Nile Water Deal against Egypt's interests*, 18 May, www.greenprophet.com/2010/05/upstream-african-countries-sign-nile-water-deal-against-egypts-interest/, accessed: 30 October 2013.

Greste, P., 2009. 'The dams that divides Ethiopians', *BBC news*, 26 March, http://news.bbc.co.uk/2/hi/africa/7959444.stm, accessed: 12 March 2015.

Grieco, J.M., 1988. 'Anarchy and the limits of cooperation: A realist critique of the newest liberal institutionalism', *International Organization*, Vol. 42, No. 3, Summer.

Grieco, J.M., 1990. *Cooperation among Nations: Europe, America, and Non-Tariff Barriers to Trade*, Ithaca, NY: Cornell University Press.

Guvele, A.C., 2003. *The Nile Basin Initiative and its implications in Post Conflict South Sudan*, Unpublished research paper supported by the USAID and International Agriculture Programs, University of Missouri, June, http://cafnr.missouri.edu/iap/sudan/doc/nile-basin.pdf, accessed: 22 April 2014.

Hadebe, S.P., 2013. 'Egypt's total monopoly of the Nile River affects development potential of the lower stream riparian states', *Jaywalking Political Discussions*, 28 April, http://shadebe.wordpress.com/2013/04/18/egypts-total-monopoly-of-the-nile-river-affects-development-potential-of-the-lower-stream-riparian-states/, accessed: 14 May 2013.

Haftendorn, H., 1999. *Water and International Conflicts*, International Studies Association Annual Convention,16−20 February, Washington, D. C.

Hagmann, T., 2005. 'Confronting the concept of environmentally induced conflict', *Peace, Conflict and Development*, Issue 6.

Hans P., Toset, W., Gleditsch, N.P., and Hegre, H. 2000. 'Shared Rivers and Interstate Conflict'. *Political Geography,* 19.

Hasenclever, A., Mayer, P. and Rittberger, V., 2000. 'Integrating theories of international regimes', *Review of International Studies*, 26.

Hassan, F.M.A., 2002. 'Lesotho: Development in a challenging environment', *A Joint World Bank-African Development Bank Evaluation No. 24526*, Washington: World Bank.

Hassan, H.A. and Rasheedy, A.A., 2011. 'The Nile River and Egyptian foreign-policy interests', in K.G. Adar and N.A. Check (eds), *Cooperative Diplomacy, Regional Stability and National Interests.The Nile River and the Riparian States*, Pretoria: Africa Institute of South Africa.

Haub, C. 2011. In 2011, World population surpasses 7 Billion. *Population Reference Bureau. http://www.prb.org/Publications/Articles/2011/world-population-7billion.aspx.* Accessed: 14-08-2017.

Hegazi, F.F., 2011. *Cooperation Over Water in the Eastern Nile Basin: Obstacles & Opportunities*, Master's project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree in the Nicholas School of the Environment of Duke University, May.

Heinrich Böll Foundation, 2012. *Sudan after separation: new approaches to a new region*, www.ke.boell.org/sites/default/files/sudan_after_separation_web.pdf, accessed: 08 February 2017.

Hendrix, C.S. and Glaser, S.M., 2007. 'Trends and triggers: climate, climate change and civil conflict in sub-Saharan Africa', *Political Geography*, Vol.26, No.6.

Hendrix, C.S., and Salehyan, I. 2010. After the Rain: Rainfall Variability, Hydro-Meteorological Disasters, and Social Conflict in Africa. In International Studies Association Annual Conference. Montreal, Quebec

Henwood, R. and Funke, N., 2002. 'Managing shared watercourse systems in Southern Africa: International relations or foreign policy?' in A. Turton and R. Henwwood (eds), *Hydro politics in the developing World: A Southern African perspective*, Pretoria: African Water Issue Research Unit.

Hepworth, N.D., 2009. *A progressive critique of IWRM in sub-Saharan Africa: Beyond capacity towards self-determined regulatory personality*, University of East Anglia.

Hernandez, N. E. 2012. Water Security Conflicts: A Regional Perspective. *Small Wars Journal*, Sep 28.

Heyns, P., 2003. 'Water-resources management in Southern Africa', in *International Waters in Southern Africa*, Nakayama, M (Ed), Tokyo, United Nations University Press.

Heyns, P. 2004. 'Achievements of Orange–Senqu River Commission in Integrated Transboundary Water Resources Management', *Paper presented at the General assembly of the international network of basin organisations*, The Martinique, 24-28 January.

Heyns, P, Patrick, M. and Turton, A., 2008. 'Transboundary Water Resource Management in Southern Africa: Meeting the Challenge of Joint Planning and Management in the Orange River Basin', *International Journal of Water Resources Development*, Vol. 24, No.3.

Hiddema, U. and G. Erasmus. 2007. Legislation and Legal Issues Surrounding the Orange RiverCatchment (Orange River Integrated Water Resources Management Plan).

Hitchcock, R.K., 2015. 'The Lesotho Highlands Water Project: Dams, development, and the World Bank', *Sociology and Anthropology*, Vol. 3, No. 10.

Hodges, R.C. 1979. The Egypt-Sudan Permanent Joint Technical commission for Nile water. Canadian Water Resources Journal, No.4, Vol.4.

Homer-Dixon, T.F, 1991. 'On the threshold: Environmental changes as causes of acute conflict', *International Security*, Vol. 16, No. 2.

Homer-Dixon, T.F., 1994. 'Environmental scarcities and violent conflict: Evidence from cases', *International Security*, Vol. 19, No. 1, Peace and Conflict Studies Program, University of Toronto.

Homer-Dixon, T.F and Blitt, J., 1998. *Ecoviolence: Links Among Environment, Population, and Security*, New York: Rowman and Littlefield Publishers.

Homer-Dixon, T.F., 1999a. *Environment, Scarcity, and Violence*, Princeton University Press, New Jersey.

Homer-Dixon, T.F, 1999b. 'Threshold of turmoil: environmental scarcities and violent conflict', in D.H. Deudney and R.A. Matthew (eds), *Contested Grounds: Security and Conflict in the New Environmental Politics*, Albany: State University of New York Press.

Homer-Dixon, T.F. 2007. Terror in the Weather Forecast. *New York Times*, 24th April. https://mobile.nytimes.com/2007/04/24/opinion/24homer-dixon.html. Accessed: 16-08-2017.

Hoover, R., 2001. *Pipe dreams: The World Bank's failed efforts to restore lives and livelihoods of dam-affected people in Lesotho* (Report), Berkeley, CA: International Rivers Network.

Horta, K., 1996. 'Making the earth rumble: The Lesotho-South Africa water connection', *Multinational Monitor*, 17(5).

Horta, K., 2007. *Resisting hydro-hegemony in Southern Africa: the Lesotho Highlands Water Project*, Third International workshop on Hydro-Hegemony, King's College London and London School of Economics, 12−13 May, www.gov.ls/about/default.php, accessed: 20 February 2012.

Hourani, A., Khoury, P.S and Wilson, C. 2004. The Modern Middle East: a reader. 2nd Edition. University of California Press.

Hudson, H., 1996. 'Resource-based Conflict: Water (In) security and its Strategic Implications', in H. Solomon (ed.), *SINK OR SWIM? Water, Resource Security and State Co-operation*, Monograph No 6, October.

Ide, T., 2015. 'Why do conflicts over scarce renewable resources turn violent? A qualitative comparative analysis', *Global Environmental Change*, 33.

Idule-Amoko, A., 2009. 'The challenges of climate change and transboundary resources in Eastern Africa', in D.W. Tadese (ed.), *Climate change and transboundary water resource conflict in Africa*, Institute for Security Studies (ISS) Workshop report, Mombasa.

Institute of Natural Resource (INR), 2016. *A framework: to guide an ecosystem approach for integrated water resource management in Lesotho*, http://inr.org.za/a-framework-to-guide-an-ecosystem-approach-for-integrated-water-resources-management-in-lesotho/, accessed: 30 August 2016.

International Environmental Agreement (IEA), 2016. *Revised Convention Creating The Niger Basin Authority*, https://iea.uoregon.edu/treaty-text/1980-nigerbasinauthorityentxt, accessed: 23 February 2017.

International Rivers, 2015. *Chinese Dams in Africa*, www.internationalrivers.org/campaigns/chinese-dams-in-africa, accessed: 04 April 2015.

International Water Law Project, 2014. *Agreement on the Nile River Basin Cooperative Framework*, http://internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf, accessed: 14 September 2014.

IRIN news, 2000. 'Focus on renewed tension with Mauritania', 8 June, www.irinnews.org/feature/2000/06/08/irin-focus-renewed-tension-mauritania, accessed: 23 February 2017.

IRIN news, 2015. 'International Court rules that main disputed island belongs to Niger not Benin', 12 July, www.irinnews.org/report/55426/benin-niger-international-court-rules-main-disputed-island-belongs-niger-not-benin, accessed: 23 February 2017.

Jacobs, I, 2006. *The Water War Debate: Swimming upstream or Downstream in the Okavango and the Nile*, Submitted in partial fulfillment of the Degree of Master of International Studies at the University of Stellenbosch, December.

Jacobs, I.M., 2009. *Norms and transboundary co-operation in Africa: the cases of the Orange-Senqu and Nile rivers*, a Thesis Submitted for the Degree of PhD, University of St. Andrews.

Jacobs, I.M., 2012. 'The Politics of Water in Africa: Norms, Environmental Regions and Transboundary', *Cooperation in the Orange-Senqu and the Nile Rivers*, New York.

Jagow-schultz, T., 2017. 'Niger: Boomerang river in Sub-Saharan Africa', *World Wide Fund For Nature.* http://wwf.panda.org/about_our_earth/about_freshwater/rivers/niger/, accessed: 01 February 2017.

Jankielsohn, R. 2012. Defining hydropolitics: The politics of water in South Africa. Journal for Contemporary History, Vol. 37, Issue 1.

Jones, B., 1996. 'The bell is tolling for down-river Basotho', *Mail and Guardian*, 5 July, http://mg.co.za/article/1996-07-05-the-bell-is-tolling-for-down-river-basotho The%20bell%20is%20tolling%20for%20down-river%20Basotho, accessed: 09 March 2016.

Jones, A., 2007. *Comparatively Assess Neo-realism and Neo-liberalism. Whose Argument do you find the More Convincing and Why?* 21 December, www.e-ir.info/2007/12/21/comparatively-assess-neo-realism-and-neo-liberalism-whose-argument-do-you-find-the-more-convincing-and-why/, accessed: 25 August 2016.

Kagwanja, P., 2007. 'Calming the waters: The East African Community and conflict over the Nile resources', *Journal of Eastern African Studies*, Vol. 1, No. 3.

Kameri-Mbote, P., 2005. 'Environment and Conflict linkages in the Great Lake region', *International Environmental Law Research Centre (IELRC) Working Paper.*

Kameri-Mbote, P., 2007. 'Water, Conflict, and Cooperation: Lessons from the Nile River Basin', *Navigating Peace*, No.4, Environmental Change and Security Program, Woodrow Wilson International Center for scholars, January.

Karyabwite, D.R., 2000. *Water Scarcity in the Nile River Valley*, UNEP/DEWA/GRID – Geneva.

Kassa, T., 2010. 'International law and moderations of physical geography: The Nile setting',in T. Tvedt, G. Chapman and R. Hagen (eds), 'Water, Geopolitics and the new World Order', *A History of Water*, SeriesII, Volume 3.I, B. Tauris, London.

Kassa, Z., 2013. 'Ethiopia endorses Nile Basin Cooperative Framework Agreement', *AllAfrica*, 13 June, www.allafrica.com/stories/201306141038.html, Accessed: 12-11 February 2014.

Katz, C.L., 2013. ‘Another cup at the Nile’s crowded Spigot: South Sudan and its Nile water rights’, *Georgetown Journal of International Law* Vol. 44. Georgetown University Law Center.

Kendie, D., 1999. ‘Egypt and the hydro-politics of the Blue Nile River’, *Northeast African Studies*, Vol. 6, No. 1-2, Henderson State University.

Kennedy, B. 2001.Environmental Scarcity and the Outbreaks of Conflict.*Population Reference Bureau* (PRB), January.http://www.prb.org/Publications/Articles/2001/EnvironmentalScarcityandtheOutbreakofConflict.aspx. Accessed: 24-10-2013.

Keohane, R.O. and Nye, J.S., 1977. *Power and Interdependence*, Boston: Little, Brown.

Keohane, R. O., 1980. ‘The theory of hegemonic stability and changes in international economic regimes, 1967−1977’, in O. Holsti, R. Siverson and A. George (eds), *Change in the international system*, Boulder, CO: Westview.

Keohane, R.O., 1982. ‘The demand for International Regimes’, *International Organisation*, Vol. 36, No.2, International Regimes, Spring.

Keohane, R.O. 1984. After Hegemony: Cooperation and Discord in the World Political Economy. Princeton, N.J.: Princeton University Press.

Keohane, R.O., 1989. *International Institutions and State Power*, Essays in International Relations Theory, Boulder, CO: Westview Press.

Keohane, R.O. 1993. ‘The Diplomacy of Structural Change: Multilateral Institutions and State Strategies’, in H. Haftendorn and C. Tuschhoff (eds), *America and Europe in an Era of Change*, Boulder, Colorado: Westview Press.

Keohane, R.O. and Martin, L.L., 1995. ‘The Promise of Institutionalist Theory’.,*International Security*, Vol. 20, No.1.

Keohane, R.O., 2012. 'Twenty Years of Institutional Liberalism', *International Relations*, Vol.26, No.2, Princeton University.

Kieyah, J., 2007. *The Nile Waters Agreement: Legal and Economic Analysis*, from selected works of Joseph Kieyah, October.

Kigomo, B.N., 2003. *Forests and Woodlands degradation in dryland Africa: A case for urgent global attention*, www.fao.org/docrep/article/wfc/xii/0169-b3.html, Accessed: 14 September 2014.

Kim, U. and Kalaurachchi, J.J., 2009. 'Climate change impacts on water resources in the upper Blue Nile river basin, Ethiopia', *Journal of the American Water Resources Association*, Vol. 45, No. 6.

Kingdom of Lesotho and Republic of South Africa, 1986. *Treaty on the Lesotho Highlands Water Project between Lesotho and South Africa*, www.dundee.ac.uk/law/iwlri/documents/treaties/basin%20specific%20and%20bilateral%20treaties/africa/orange/1986%20treaty%20on%20the%20lesotho%20highlands%20water%20project.pdf, Accessed: 17 October 2016.

Kistin, E. and Ashton, P. 2008. 'Adapting to change in transboundary rivers: An analysis of treaty flexibility on the Orange-Senqu River Basin', *International Journal of Water Resources Development*, Vol.24, No.3.

Kistin, E., 2010. *Critiquing Cooperation: The Dynamic Effects of Transboundary Water Regimes*, Thesis submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy in Development Studies, University of Oxford.

Kistin, E.J., 2012. 'Critiquing Cooperation: Transboundary Water Governance and Adaptive Capacity in the Orange-Senqu Basin', *Journal of Contemporary Water Research and Education*, Issue 149, Universities Council on Water Resources, December.

Klaphake, A., 2005. *Kooperation an internationalen Flüssen aus ökonomischer Perspektive: Das Konzept des Benefit Sharing*, BMZ-Forschungsvorhaben,

Grenzüberschreitendes Wassermanagement in Afrika, Bonn**:** *Deutsches Institut für Entwicklungspolitik*.

Klare, M.T. 2001. The New geography of conflict. *Foreign Affairs*, Vol. 80, No. 3.

Klare, M.T., 2002. *Resource Wars: The New Landscape of Global Conflict.* New York.

Klare, M.T. 2013. Resource Shock: How Resource Scarcity and Climate Change Could Produce a Global Explosion. **Tom Dispatch,** 21st April. http://www.alternet.org/environment/resource-shock-how-resource-scarcity-and-climate-change-could-produce-global-explosion. Accessed: 09-08-2014.

Kliot, N., 1994. *Water Resources and Conflict in the Middle East*. Haifa: Water Research In-stitute, Technion.

Kliot, N., Shmueli, D. and Shamir, U., 2001. *Institutions for management of transboundary water resources: their nature, character and shortcomings*. Water Policy 3.

Knobelsdorf, V., 2006. 'The Nile Waters Agreements: Imposition and impacts of a transboundary legal system', *Columbia Journal of Transnational Law*, Vol. 44, No. 2.

Krasner, S., 1982. 'Structural causes and regime consequences: Regimes as intervening variables', *International Organisation,* Vol. 36, No. 2, Spring.

Krasner, S.D., 1983. *International Regimes*, Ithaca, NY: Cornell University Press.

Krasner, S.D., 1991. *Global Communications and National Power: Life on the Pareto Frontier*, World Politics, 43.

Kranz, N., Interwies, E. and Vidaurre, R., 2005. *Transboundary Regimes in the Orange-Senqu Basin*, Contribution to Deliverable 1.3.1 of the NeWater Project, Berlin.

Kreamer, D.K., 2012. 'The past, present, and future of water conflict and international security', *Journal of Contemporary Water Research and Education*, Issue, 149, December.

Krysanova, V., Dickens, C., Timmerman, J., Varela-Ortega, C., Schlüter, M., Roest, K., Huntjens, P., Jaspers, F., Buiteveld, H., Moreno, E., Carrera, J., Slámová, R., Martínková, M., Blanco, I., Esteve, P., Pringle, K., Pahl-Wostl, C., and Kabat, P. 2010. Cross-Comparison of Climate Change Adaptation Strategies across Large River Basins in Europe, Africa and Asia. *Water Resources Management 24.*

Kukk, C. and Deese, D., 1996. 'At the Water's Edge: Regional Conflict and Cooperation over Fresh Water', *UCLA Journal of International Law and Foreign Affairs*, Vol. 21, No.1.

Kwetegyeka, J., Mwongyera, A., Mbabazi, J., Muwanga, A., and Ntale, M., 2014. 'Impact of the disused Kilembe mine pyrites on the domestic water quality of Kasese town, Western Uganda', *Caribbean Journal of Science and Technology*, Vol.2.

Lam, A., 2012a. 'The rising tide – Environmental refugees', *The New America Media*, 15 August, http://newamericamedia.org/2012/08/the-rising-tide----environmental-refugees.php, accessed: 19 July 2016.

Lam, A., 2012b. 'Number of Environmental Refugees to Grow to 50 Million by 2020', *Earth Island Journal*, 23 August. www.earthisland.org/journal/index.php/elist/eListRead/number_of_environmental_refugees_to_grow_to_50_million_by_2020/, accessed: 19 July 2016.

Lamere, C., 2012. 'Nile Basin at a turning point as political change roil balance of power and competing demands proliferate', *New Security Beat*, 4 September.

Langea, G., Mungatanab, E. and Hassanb, R., 2007. 'Water accounting for the Orange River Basin: An economic perspective on managing a transboundary resource', *Ecological economic,* series 61.

Laylin, T., 2011. 'Defiant Ethiopia to proceed with Massive Dam on the Nile River', *Green Prophet*, 4 April, www.greenprophet.com/2011/04/ethiopia-nile-dam/, accessed: 06 February 2013.

Le Billon, P., 2000. *The Political economy of resource wars*, Alexander Hamilton Institute, www.alexanderhamiltoninstitute.org, accessed 19 April 2013.

Lee, S., 2001. 'Emerging threats to international security: Environment, refugees, and conflict', *Journal of International and Area Studies*, Vol. 8, no. 1.

Leroy, M. and Gebresenbet, F., 2011. 'Climate Conflicts in the Horn of Africa', in V. Gounden (ed.), *Environment, Climate Change and Conflict*, Conflict Trends, Issue 2.

Lesotho Highlands Water Project (LHWP) Treaty, 1986. *Treaty on the Lesotho highlands water project between the government of the Kingdom of Lesotho and the government of the Republic of South Africa*, 24 October, www.fao.org/docrep/w7414b/w7414b0w.htm, accessed: 11 November 2016.

Lesotho Times. 2017. 'Water sources under threat', 25 February. http://lestimes.com/water-sources-under-threat/, accessed: 13 March 2017.

Levy, M. A. 1995a. Is the environment a National Security Issue? *International Security, Vol. 20. No. 2.*

Levy M. A. 1995b. Time for a third wave of environment and security scholarship? *The Environmental Change and Security Project Report 1.*

L'Heureux, M., 2014. *What is the El Niño–Southern Oscillation (ENSO) in a nutshell?* https://www.climate.gov/news-features/blogs/enso/what-el-ni%C3%B1o%E2%80%93southern-oscillation-enso-nutshell, accessed: 19 July 2016.

Libiszewski, S., 1992. *What is an Environmental Conflict*?, Paper presented at the first coordination meeting of Environment and Conflict Project (ENCOP), Zurich. 30 April -1 May.

Lie, H.S., 2010. *Supporting the Nile River Basin: a political analysis beyond the river*, Norwegian Institute of International Affairs, A desk review study commissioned by the Norwegian Agency for Development Cooperation (NORAD).

Likoti, F.J., 2006. *African Military Intervention in African Conflicts: An Analysis of Military Intervention in Rwanda, the DRC and Lesotho*, Submitted in fulfilment of the requirements for the degree of PhD in the Centre for Southern African Studies, School of Government, University of the Western Cape.

Lindemann, S., 2009. 'Success and Failure of International River Basin Management: The case of Southern Africa', in H.G. Brauch, U.O. Spring, J. Grin, C. Mesjasz, P. Kameri-Mbote, N.C. Behera, B. Chourou and H. Krummenacher (eds), 'Facing global environmental change: Environmental, Human, Energy, Food, Health and Water Security concepts', *Hexagon Series on Human and Environmental Security and Peace*, Vol.4.

Link, M.P., Piontek, F., Scheffran, J. and Schilling, J., 2014. 'On foes and flows: Water conflict and cooperation in the Nile River Basin in times of climate change', *Research Group Climate Change and Security*, University of Hamburg, Grindelberg.

Lino, V., 2013. *Post-Independence South Sudan: prospects and implication on the Nile basin hydro-politics*. A research project submitted in partial fulfilment of the requirements of the award of a degree of master of arts in diplomacy. University of Nairobi. October.

Lipschutz, R. D. 1989. *When Nations clash: Raw materials, Ideology and Foreign Policy.* New York: Ballinger.

Lipson, C. 1984. International Cooperation in Economic and Security Affairs. World Politics, Volume 37, Issue 1. October. Cambridge University Press.

Litfin, K.T., 1997. 'Sovereignty in World Ecopolitics'*, Mershon International Studies*, Review 41.

London School of Economics and Political Science (LSE). 2015. *The Global Climate Legislation Study: Nigeria.* Grantham Research Institute on Climate Change and the Environment, 7 December. www.lse.ac.uk/GranthamInstitute/legislation/countries/nigeria/, accessed: 23 February 2017.

Lonergan, S. 1999. Global Environmental Change and Human Security (GECHS). *GECHS science plan.* April.

Lowi, M., (1993). *Water and power: The politics of a scarce resource in the Jordan river basin*, Cambridge: Cambridge University Press.

Lowi, M.R., 1995. 'Rivers of Conflict, Rivers of Peace',*Journal of International Affairs*, Vol. 49, no.1,Summer.

Lumumba, P.L.O., 2007. 'The Interpretation of the 1929 Treaty and its Legal Relevance and Implications for the Stability of the Region', *African Sociological Review*, Vol. 11, Issue 1.

Luscombe, S., 2012. *19th Century Timeline*, www.britishempire.co.uk/timeline/19century.htm, accessed: 20 May 2014.

Magdoff, F. 2013. Global Resource Depletion: Is Population the Problem*? Monthly review*, https://monthlyreview.org/2013/01/01/global-resource-depletion/. Accessed: 16-08-2017.

Mahé, G., Liénou, G. and Adeaga, O., 2009. *Water availability and access*. BFP Niger WP2.

Malanczuk, P. 1997. Akehurst's modern introduction to international law. 7th revised Edition. New York.

Marterns, A.K., 2011. *Impacts of Global Change on the Nile Basin: Options for Hydropolitical Reform in Egypt and Ethiopia*, International Food Policy Research Institute (IFPRI), Discussion Paper 01052, January.

Martin, A. 2005. Environmental Conflict between refugee and host communities. *Journal of Peace Research, Vol. 42, No.3.*

Marty, F., 2001. *Managing International Rivers: Problems, Politics and Institutions*, European University Studies: Series 31, Political Science, Vol. 421, Bern: Peter Lang.

Mason, S. 2004. From Conflict to Cooperation in the Nile Basin. Center for Security Studies, Swiss Federal Institute of Technology, Zurich Swiss Federal Institute for Environmental Science and Technology (EAWAG). ETH Zentrum SEI, Seilergraben 49,

Mathews, J. T. 1989.Redefining Security.*Foreign Affairs*, Vol. 68, No. 2.Spring.

Mathibeli, N., 2016. 'The beauty of Lesotho's water crisis', *News24*, 11 January. www.news24.com/MyNews24/the-beauty-of-lesothos-water-crisis-20160111, accessed: 10 March 2016.

Matthew, R., 1999. 'Introduction: mapping contested grounds', in D. Deudney and R. Matthew (eds), *Contested grounds: security and conflict in the new environmental politics*, Albany: State University of New York Press.

Mayton, J., 2012. 'Water for all: The Nile Basin conundrum', *DANTEmag*, 8 December. www.dantemag.com/2012/12/water-for-all-the-nile-basin-conundrum/, accessed: 30 October 2013.

Mbaiwa, J.E., 2004. 'Causes and Possible Solutions to Water Resource Conflicts in the Okavango River Basin: The Case of Angola, Namibia and Botswana', *Physics and Chemistry of the Earth,* Parts A/B/C, Vol. 29, No. 15.

Mbaku, J. M and Mwangi S. K. 2015. 'The limits of the new "Nile Agreement'. *Africa in Focus*, 28th April.https://www.brookings.edu/blog/africa-in-focus/2015/04/28/the-limits-of-the-new-nile-agreement/. Accessed: 16-05-2017.

McCaffrey, S.C., 2003. *The Law of International Watercourses*. 2nd ed. Oxford University Press.

Mckinney, D.C. 2003. Cooperative Management of Transboundary Water Resources in Central Asia. In: BURGHART, D. (Editor); SABONIS-HELF, T. (Editor) (n.y.): In the Tracks of Tamerlane. Central Asia's Path to the 21st Century. Washington D.C.

McKinney, D., 2012. *CE 397 Transboundary Water Resources: Niger Basin*, www.ce.utexas.edu/prof/mckinney/ce397/Topics/Niger/Niger.htm, accessed: 23 February 2017.

Meissner, R., 2000. 'The Case of the Orange River', *Conflict Trends 2*.

Mekonnen, K. 1999. The Defects and Effects of Past Treaties and Agreements on the Nile River Waters: Whose Faults Were they? http://www.ethiopians.com/abay/engin.htm. Accessed: 16-08-2017.

Menocal, A.R., Fritzb, V. and Raknerc, L., 2008. 'Hybrid regimes and the challenges of deepening and sustaining democracy in developing countries', *South African Journal of International Affairs*, Vol. 15, No. 1, June.

Meyer, C., 2013. *Integrated water resources management – The Orange-Senqu River Basin in South Africa*, A Master Thesis submitted in partial fulfilment of the requirements for the degree Master of Science (M.Sc.), Global Transformation and Environmental Change, University of Hamburg, Germany.

Michel, D. and Passarelli, R., 2014. 'The Climate Wars are already here', *Foreign Policy*, 17 December. http://foreignpolicy.com/2014/12/17niger-river-basin-climate-wars-are-already-here/, accessed: 03 February 2017.

Milner, H. 1992. International theories of cooperation among nations: strengths and weaknesses. *World Politics*, Vol. 44, No. 3. Cambridge University Press.

Mitchell, R.B., 2001. *Comparative Analysis of the Effectiveness of Environmental Treaties*, Eugene, Oregon: University of Oregon, unpublished paper.

Moffet, G.D., 1990. 'Nile River rights run deep', *The Christian Science Monitor*, 13 March, www.csmonitor.com/1990/0313/o1wat2.html, accessed: 23 February 2015.

Mokorosi, P.S., 2007. *Can benefits be shared equitably among a variety of stakeholders in a transboundary river basin? Learning from Zambezi and Orange-Senqu River Basins*, Paper Prepared for 8th WaterNet/WARFSA/GWP-SA Symposium, 30 Oct - 3 Nov, Livingstone.

Mostert, E. 2003. Conflict and cooperation in the management of international freshwater resources: a global review. Delft University of Technology, Delft. (SC-/WS/48).

Muller, M., Chikozho, C. and Hollingworth, B., 2015. 'Water and Regional Integration: The role of water as a driver of regional economic integration in Southern Africa', *Report to the Water Research Commission (WRC),* Report No 2252/1/14, March.

Munia, H., Guillaume, J.H.A., Mirumachi, N., Porkka, M., Wada, Y. and Kummu, M., 2016. 'Water stress in global transboundary river basins: significance of upstream water use on downstream stress', *Environmental Research Letters*, 11 January.

Muramuzi, F., 2011. 'Sustainable development', *Aljazeera*, 13 June. www.aljazeera.com/programmes/struggleoverthenile/2011/06/201161214273160859 1.html, accessed: 04 April 2015.

Mwangi, O., 2007. 'Hydro politics, ecocide and human security in Lesotho: a case study of the Lesotho Highlands Water Project', *Journal of Southern African Studies*, Volume 33, no. 1, March.

Mwangi, O.G., 2008. *Environmental change and human security in Lesotho: The role of the Lesotho Highlands Water Project in environmental degradation*, Institute for Security Studies, 1 September, www.issafrica.org/topics/environmental-security-and-climate-change/01-sep-2008-environmental-change-and-human-security-in-lesotho-the-role-of-the-lesotho-highlands-water-project-in-environmental-degradation-oscar-g, accessed: 17 October 2016.

Myers, N. 1993. *Ultimate Security: the environment as the basis of political stability*, New York.

Myers, N, 2004. *Environmental security: What's new and different?* Keynoter for Conference on Environment, Security and Sustainable Development, The Hague, The Netherlands, 9-12 May. Institute for Environmental Security. The Hague.

Naidoo, R., 2017. 'Orange-Senqu River Basin gets R48.6m for water security', *Infrastructurene.ws*, 20 February, www.infrastructurene.ws/2017/02/20/orange-senqu-river-basin-gets-r48-6m-for-water-security/#, Accessed: 14 March 2017.

National Mirror, 2016. 'Stakeholders in fresh move to tackle problems of Niger Basin Authority', 31 May. http://nationalmirroronline.net/new/stakeholders-in-fresh-move-to-tackle-problems-of-niger-basin-authority/, accessed: 21 February 2017.

Neethling, T., 1999. 'Military Intervention in Lesotho: Perspectives on Operation Boleas and Beyond', *The Online Journal of Peace and Conflict Resolution*, Issue 2.2, May.

Neumayer, E., 2001. 'How Regime Theory and Economic Theory of International Environmental Cooperation can learn from each other', *Global Environmental Politics*, Vol. 1, No. 1. February.

News24, 2016. 'The beauty of Lesotho's water crisis', 11 January, www.news24.com/MyNews24/the-beauty-of-lesothos-water-crisis-20160111, accessed: 23 August 2016.

Niasse, M., n.d. *The Niger Basin Authority. SHARE Toolkit: Case Studies*, IUCN Water Programme, www.iucn.org/sites/dev/files/import/downloads/niger.pdf, accessed: 23 February 2017.

Nile Basin Initiative (NBI), 2005. 'Nile Basin Regional Water Quality Monitoring Baseline Study Report for Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda', *Nile Trans boundary Environmental Action Project*, August.

Nile Basin Initiative, 2012a. *One River One People One Vision*, NBI. Entebbe.

Nile Basin Initiative, 2012b. *Nile Information System: The state of the River Nile Basin*, http://nileis.nilebasin.org/system/file/Nile%20SoB%20Report%20Chapter_%209%20-%20SUmmary.pdf, accessed: 12 November 2013.

Nile Basin Initiative, 2013. *Nile Basin Initiative Corporate Report*, July 2012-June 2013, Entebbe.

Nile Basin Initiative, 2014. *Nile Basin Initiative*, http://nilebasin.org/index.php/ about-us/nile-basin-initiative, accessed: 02 June 2014.

Nordas, R. and Gleditsch, N.P., 2007. 'Climate change and conflict', *Political Geography*, 26.

North D., 1990. *Institutions, institutional change and economic performance*, Cambridge University Press, Cambridge.

Obengo, J.O., 2016. 'Hydropolitics of the Nile: The case of Ethiopia and Egypt', *African Security Review*, Vol. 25, Issue 1.

Oberthur, S. 2001. Preventing Environmentally-induced conflicts through International Environmental Policy. In Carius, A and Vincze, A (Eds.). Responding to Environmental Conflicts: Implications for Theory and Practice. Kluwer Academic Publishers. Budapest.

Oduntan, G., 2015. 'Africa's border disputes are set to rise – but there are ways to stop them', *The Conversation*, 14 July, http://theconversation.com/africas-border-disputes-are-set-to-rise-but-there-are-ways-to-stop-them-44264, accessed: 28 September 2016.

Oestigaard, T., 2012. 'Water scarcity and food scarcity along the Nile: politics, population increase and climate change', *Current African Issues* 49.Uppsala.

Ohlsson, L., 1999. *Environment, Scarcity and Conflict: A Study of Malthusian Concerns*, Göteburg, Sweden: Department of Peace and Development Research.

Okascha, R., 2012. 'Water Scarcity and Regional Security in the Nile Basin.vorgelegtgeboren in Zwickau', *Fremdsprachliche Philologien Centrum für Nah- und Mittelost-Studien*,Philipps-Universität Marburg Fachbereich, Marburg. August.

Okbazaghi, Y., 2008. *Water Resources and Inter-riparian Relations in the Nile basin: The search for an integrative discourse*, Albany: State University of New York Press.

Oklahoma Bar Association. 2015. Methods for resolving conflict and disputes. http://www.okbar.org/public/Brochures/methodsForResolvingConflictsAndDisputes.aspx. Accessed: 08-08-2017.

Okoth-Owiro, A., 2004. 'The Nile Treaty: State succession and International Treaty Commitments', *A case study of the Nile water Treaties, Occasional Papers*, East Africa**,** Nairobi.

Olomoda I., 2002. 'Integrated Water Resources Management: The Niger Basin Authority's Experience', in S. Castelein (ed.), *From Conflict to Co-operation in International Water Resources Management: Challenges and Opportunities*, UNESCO-IHE Institute for Water Education International Conference Proceedings, 20-22 November, Delft.

Oloo, A., 2007. 'The quest for cooperation in the Nile Water Conflicts: the case of Eritrea', *African Sociological Review* 11, No. 1.

Ong'ayo, O.A., 2008. *Political Instability in Africa: where the problem lies and alternative perspectives*. Presented at the Symposium 2008: "Afrika: een continent op drift", 9th September. The African Diaspora Policy Centre, Amsterdam.

ORASECOM, 2000. *Agreement for the establishment of the Orange-Senqu River Commission*. Windhoek

ORASECOM, 2008. *Orange-Senqu River Basin: Preliminary Transboundary Diagnostic Analysis*, UNDP Main Report.

Othieno, T. and Zondi, S., 2006. *Co-operative management of Africa's water resources: a basis for resolving conflicts on the Nile River Basin*, Institute for Global Dialogue, Issue 59, May.

Paisley, R.K. and Henshaw, T.W., 2013. *Transboundary governance of the Nile River Basin: Past, present and future*. International Waters Governance Initiative. Vancouver: University of British Columbia.

Pakes, L., 2013. 'The politics of water scarcity in the Nile Basin: The case of Egypt', *Journal of Politics and International Studies*, Vol. 9, Summer.

Passarelli, R. and Michel, D., 2014. *The climate wars are already here*, Foreign Policy, 17 December.

Patel, K., 2013. 'Analysis: What does the AU gain from suspending Egypt?' *Daily Maverick*, 8 July, www.dailymaverick.co.za/article/2013-07-07-analysis-what-does-the-au-gain-from-suspending-egypt/#.U6p1YBgaLVI, accessed: 25 June 2014.

Pereira, J.C. 2015. Environmental issues and international relations, a new global (dis)order – the role of International Relations in promoting a concerted international system. *Revista Brasileira de Política Internacional*, No. 58, Vol.1.

Percival, V. and Homer-Dixon, T., 1998. 'Environmental Scarcity and Violent Conflict: the case of South Africa', *Journal of Peace Research*, Vol. 35, No. 3, Sage Publications: London.

Pimentel, D., Huang, X., Cordova, A. and Pimentel, M., 1996. 'Impact of population growth on food supplies and environment', *Presented at AAAS Annual Meeting*, 9 February, www.dieoff.com/page57.htm, accessed: 07 July 2016.

Poolman, J., 2014. 'South border dispute', *Informante*, 30 October, www.informante.web.na/south-border-dispute.15089, Accessed: 28 September 2016.

Postel, S and Wolf, A.T. 2001. 'Dehydrating Conflict'. *Foreign Policy*, no: 126. Sept-Oct.

Pottinger, L., 1996. 'Environmental Impacts of Large Dams: African Examples', *International Rivers*, 1 October, www.internationalrivers.org/en/africa/environmentalimpacts-large-dams-african-examples, accessed: 04 April 2015.

Pottinger, L., 2013. 'Why has the Nile River become a battleground?' *International River*, 06 July, www.internationalrivers.org/blogs/229/why-has-the-nile-river-become-a-battleground, accessed: 05 August 2013.

Presse, A.F., 2001. 'Water, the looming source of World Conflicts', *Global Policy Forum*, 20 March, www.globalpolicy.org/component/content/article/198/40338.html, Accessed: 08 March 2016.

Protocol VI, 1999. *Protocol VI to the Treaty on the Lesotho Highlands Water Project Supplementary Arrangements regarding the System of Governance for the Project*.

Purkitt, H.E., 2009. *African Environmental and Human Security in the 21st Century*, Amherst, New York: Cambria Press.

Qasem, I., 2010. *Resource Scarcity in the 21st Century: Conflict or Cooperation*? The Hague Centre for Strategic Studies (HCSS) and TNO, Paper No. 03, The Hague.

Raadgever, T., 2005. *Transboundary River Basin Management – State-of-the-art review on transboundary regimes and information management in the context of adaptive management*, Centre for River Basin Administration, Delft University of Technology, November.

Raadgever, G.T., Mostert, E., Kranz, N., Interwies, E. and Timmerman, J.G., 2008. 'Assessing Management Regimes in Transboundary River Basins: Do They Support Adaptive Management?' *Ecology and Science*, Vol. 13, No.1.

Rahman, M.A., 2011. 'The geopolitics of water in the Nile River Basin', *Global Research*, 24 July, http://www.globalresearch.ca/the-geopolitics-of-water-in-the-Nile-river-basin/25746, accessed: 06 April 2013.

Raleigh, C. and Urdal, H., 2007. 'Climate change, environmental degradation and armed conflict', *Political Geography*, Vol.6, No.6.

Raleigh, C., and Kniveton, D. 2012. Come rain or shine: an analysis of conflict and climate variability in East Africa. Journal of Peace Research, Vol. 49, No.1.

Rathgeber, E.M., 1996. 'Women, men, and water-resource management in Africa', in E. Rached, E.M. Rathgeber and D.B. Brooks (eds), *Water management in Africa and the Middle East: Challenges and Opportunities*. Ottawa, ON: IDRC.

Reig, P., 2011. *Aqueduct Partnership to Map Water Risks in Africa's Orange-Senqu Basin*, World Resources Institute, 2 November. www.wri.org/blog/2011/11/aqueduct-partnership-map-water-risks-africas-orange-senqu-basin, accessed: 11 August 2016.

Reyskens, M., 2011. *In hot pursuit: Resource wars in Africa*, 16 November, www.consultancyafrica.com/index.php?option=com_content&view=article&id=901:in-hot-pursuit-resource-wars-in-africa-&catid=60:conflict-terrorism-discussion-papers&Itemid=265, accessed: 19 April 2013.

Romm, J. 1993. Defining National Security: The Non-military Aspects.Council on Foreign Relations Press. New York.

Rønnfeldt, C.F., 1997. 'Three Generations of Environment and Security Research', *Journal of Peace Research*, 34.

Roudi-Fahimi, F., Creel, L., and De Souza, R. M. 2002 Finding the Balance: Population and Water Scarcity in the Middle East and North Africa.Population Reference Bureau, July.

Rubenson, S., 1991. *The Survival of Ethiopian Independence*. Addis Ababa: Kuraz Publishing Agency.

Rutagwera, P., 2014. 'NBI and Chinese delegation discuss future partnerships', *IW: Learn* – International Waters Learning Exchange and Resource Network, 8 May, http://iwlearn.net/iw-projects/3398/news/nile-basin-initiative-news/100d98783a7a69fdd757308fd765ab82, accessed: 25 June 2014.

Sahel Standard, 2015. 'War looms between Nigeria, Niger over River Niger', 4 May, http://sahelstandard.com/index.php/2015/05/04/war-looms-between-nigeria-niger-over-river-niger/, accessed: 23 February 2017.

Salman, S., 2013. 'The Nile Basin Cooperative Framework Agreement: A peaceful unfolding African Spring?' *Water International*, Vol. 38, No. 1.

Savenije, H.G. and Van der Zaag P., 2000. *Conceptual Framework for the Management of Shared River Basins with Special Reference to the SADC and EU*, Water Policy 2, No. 1-2.

Scheumann, W. and Neubert, S. (eds). 'Study for the research and consultancy project', *Cooperation on Africa's transboundary water resources*, on behalf of the Ministry for Economic Cooperation and Development (BMZ).

Schilling, D.R., 2013. 'Egypt's $90 Billion South Valley Project', *Industry Tap*, 10 January. http://www.industrytap.com/egypts-90-billion-south-valley-project/539, accessed: 19 February 2015.

Schirber, M., 2007. 'Why Desalination Doesn't Work (Yet)', *Live Science*, 25 June. http://www.livescience.com/4510-desalination-work.html, accessed: 19 July 2016.

Schwartz, D. and Singh, A., 1999. *Environmental Conditions, Resources, and Conflicts: An Introductory Overview and Data Collection*, UNEP.

Schwartz, D.M., Deligiannis, T. and Homer-Dixon, T.F., 2000. 'The Environment and Violent Conflict: A Response to Gleditsch's Critique and Some Suggestions for Future Research'. *Environmental change & security,* project report, Issue 6. Summer.

Scudder, T. 2003.The Aswan High Dam case.http://people.hss.caltech.edu/~tzs/Aswan%20High%20Dam%20case.pdf. Accessed: 04-04-2015.

Sebastian, A.G., 2008. *Transboundary Water Politics: Conflict, Cooperation and Shadows of the past in the Okavango and Orange River Basins of Southern Africa*, Dissertation, University of Maryland.

Shilomboleni, A., 2006. *Equitable water allocation: A case between South Africa and Namibia on the Lower Orange River*, Ministry of Agriculture Water and Forestry, Department of Water Affairs and Forestry, Windhoek.

Shinn, D. H., 2006. 'Nile Basin Relations: Egypt, Sudan and Ethiopia', *Elliott School of International Affairs*, The George Washington University, July, http://elliott.gwu.edu/news/speeches/shinn0706_nilebasin.cfm, accessed: 06 February 2013.

Siegfried, T and Bernauer, T. 2007. Estimating the performance of international regulatory regimes: Methodology and empirical application to international water management in the Naryn/Syr Darya basin. Water Resources Research 43(11): W11406.

Simpkins, G., 2010. 'Africa faces water war threats', *Africa Rising 21st Century*, 26 February, http://africarising2010.blogspot.co.za/2010/02/africa-faces-water-war-threats.html, accessed: 11 March 2016.

Sinclair, M., 1996. 'The Environmental Cooperation Agreement Between Mexico and the United States: A Response to the Pollution Problems of the Borderlands', *Cornell International Law Journal*, 19.

Sinnona, G., 2012. *Two-tier water governance in the Nile River Basin*, www.feem-web.it/ess/ess12/files/papers/sinnona.pdf, accessed: 04 June 2014.

Smil, V. 1997. China's environment and security. *SAIS Review*, Vol. 17, No.1. Winter-Spring.

Snidal, D., 1996. 'Political Economy and International Institutions', *International Review of Law and Economics*, Vol. 16, No. 1.

Solomon, H., 1996. *Towards the 21st century: A new Global Security Agenda*?, Institute for Defence Policy (IDP), papers, 6, Halfway House, June.

Solomon, H., 2014. 'Potential for cooperation rather than conflict in the face of water degradation: The cases of the Nile River and Okavango River Basins', *JOURNAL*, Vol. 39, No. 1. June.

Sombroek, W. and Sene, E., 1993. *Land degradation in arid, semi-arid and dry sub-humid areas: rainfed and irrigated lands, rangelands and woodlands*, Inter-governmental negotiating committee for the preparation of a convention to combat desertification and drought (INCD), First Substantive Session, Nairobi, 24 May−4 June.

Southern African Development Community (SADC), 2000. *The revised Protocol on Shared Watercourses in the Southern African Development Community*, Windhoek.

Southern Times, 2015. 'Getting water co-operation to flow', 26 October, http://southernafrican.news/2015/10/26/getting-water-co-operation-to-flow/, accessed: 11 August 2016.

Sprinz, D.F., 1999. 'Modeling environmental conflict', *Environmental change and security*.

Squires, N., 1999. 'Lesotho's white gold', *BBC World News*, 10 December, http://news.bbc.co.uk/1/low/programmes/from_our_own_correspondent/555995.stm, accessed: 09 March 2016.

Starr, J. R., 1991. 'Water Wars', *Foreign Policy*, Issue 82. Spring.

Steinbrueck, E., 2014. *Water Scarcity and International Conflict in Africa: A Game Theory Approach*.

Stephen, H and Simmons, B.A. 1987. Theories of international regimes. *International Organization* Vol. 41, no. 3.

Stoa, R.B., 2014. 'The United Nations Watercourses Convention on the Dawn of Entry into Force', *Vanderbilt Journal of Transnational Law*, Vol. 47.

Sudan Tribune, 2008. 'Kenya says Sudan and Egypt want to monopolize Nile water', 9 November, www.sudantribune.com/spip.php?article29199, accessed: 14 September 2014.

Sullivan, C.A., 2014. 'Challenges for Management of the Orange/Senqu', in V.R. Squires, H.M. Milner and K.A. Daniell (eds), *River Basin Management in the Twenty-first Century: Understanding People and Place*, London.

Swain, A. and Jamali, Q., 2011. 'New challenges for Nile Basin cooperation', in K. Lundqvist (ed.), *Water: a source of development and conflict*. *New Routes – A journal of peace research and action*, Vol. 15, No. 3.

Swain, A. and Krampe, F., 2011. 'Transboundary Rivers and Climate Change: African and Asian Rivers', in V. Gounden (ed.), *Environment, Climate Change and Conflict*, Conflict Trends, Issue 2.

Tadesse, D. 2010. *The impact of climate change in Africa*, Institute for Security Studies, Paper 220, November.

Tadese, K.W., 2013. *International Watercourses Law in the Nile River Basin: Three States at a crossroads*, New York: Routlegde.

Talbi, A., 2013. '1 River Basin, 9 Countries, 1 Vision', *The Water Blog – World Bank Blogs*, 20 March. http://blogs.worldbank.org/water/1-river-basin-9-countries-1-vision, accessed: 23 February 2017.

Tanzler, D., Carius, A. and Oberthur, S., 2002. 'Climate change and conflict prevention: Can climate change impacts increase conflict potentials? What is the

relevance of this issue for the international process on climate change'? *Environmental Policy*.

Tapela, B. 2006. Stakeholder Participation in The Transboundary Management of The Pungwe River Basin. In. Earle, A and Malzbender, D. (Eds.). *Stakeholder participation in transboundary water management –selected case studies.* African Centre for Water Research. Cape Town.

Terminski, B., 2011. *Towards recognition and protection of forced environmental migrants in the public international law: Refugee or IDPs umbrella*, Washington: Policy Studies Organization Summit Proceedings.

Thakalekoala, T., 2003. 'Ombudsman releases report on Lesotho highlands development authority and affected communities', *AllAfrica.com*, August 6. http://allafrica.com/stories/200308060849.html, accessed: 09 March 2016.

Thakur, M. 2009. Building on Progress?Chinese engagement in Ethiopia. *China in Africa Project occasional paper* No. 38.South African Institute of International Affairs (SAIIA).

The Journal, 2012. *UN: Somali famine is over, but action still needed*, www.thejournal.ie/un-somalian-famine-is-over-but-action-stll-needed-347449-Feb2012/, accessed: 19 January 2017.

Theisen, O.M. and Brandsegg, K.B., 2007. *The environment and non-state conflicts in sub-Saharan Africa*, Paper presented to the 48th Annual Convention of the International Studies Association, 28 February−3 March.

Thompson, L., 1991. 'Of myths, monsters and money: Regime conceptualisation and theory in the Southern African context', *Journal of Contemporary African Studies*, Vol.10, No.2.

Thompson, M., 2005. 'Ex-UN chief warns of water wars', *BBC News*, 2 February. http://news.bbc.co.uk/2/hi/africa/4227869.stm, accessed: 21 March 2013.

Thurston, A., 2011. 'South Sudan could shake up Nile River status quo', *The Christian Science Monitor*, 27 September, www.csmonitor.com/World/Africa/Africa-Monitor/2011/0927/South-Sudan-could-shake-up-Nile-River-status-quo, accessed: 20 May 2013.

Tir, J. and Diehl, P., 1998. 'Demographic pressure and interstate conflict: linking population growth and density to militarized disputes and wars', *Journal of Peace Resource*, Vol.35, No.3.

Tompkins, R., 2007. *Institutional Structures in the four Orange Basin States. Orange River Integrated Water Resources Management Plan*, Pretoria: WRP Consulting Engineers.

Toset, H. P. W., Gleditsch, N. P., and Hegre, H. 2000. Shared rivers and interstate conflict.*Political Geography*, Vol. 19, No. 6.

Transformation Resource Centre (TRC), 2003. 'Resettled communities speak out', *Work for Justice*, 65, Morija: TRC.

Treaty series. No.4. 1906. *Agreement between the United Kingdom and the Independent State of the Congo*, Signed at London, May 9, 1906.

Trolldalen, J.M. 1992: "International Environmental Conflict Resolution: the Role of the United Nations", (World Foundation for International Development, Washington, DC.).

Tsuma, W., 2011. 'Climate Change-Conflict nexus: Framework for policy oriented action', in V. Gounden (ed.), *Environment, Climate Change and Conflict*, Conflict Trends, Issue 2.

Tulloch, J. 2009. 'Water Conflicts: Fight or Flight?' *Allianz*, August 26. http://knowledge.allianz.com/en/globalissues/climate_change/natural_disasters/water_conflicts.html Accessed: 11-03-2013.

Turton, A.R., 2000a. 'Water Wars in Southern Africa: Challenging Conventional Wisdom', in H. Solomon and A. Turton (eds), *Water Wars: Enduring Myth or impending reality*, African Dialogue, Monograph, Series 2,KwaZulu Natal: ACCORD.

Turton, A.R., 2000b. 'A Cryptic Hydropolitical History of the Nile Basin for the Students of Hydropolitics', *Study Guide for Pretoria University*, Pretoria.

Turton, A.R., 2003. 'An overview of the hydropolitical dynamics of the Orange River basin', in M. Nakayama (ed.), *International Waters in Southern Africa*, Tokyo, United Nations University Press.

Turton, A.R., 2004. 'The Evolution of Water Management Institutions in Selected Southern African International River Basins', in K.A. Biswas, O. Ünver and C. Tortajada (eds), *Water as a Focus for Regional Development*, New Delhi, Oxford University Press.

Turton, A. R., Meissner, R., Mampane, P.M. and Seremo, O., 2004. 'A Hydropolitical History of South Africa's International River Basins', *Water Research Commission Report*, University of Pretoria.

Turton, A., 2008. 'The Southern African Hydropolitical Complex', in O. Varis, C. Tortajada and A.J. Biswas (eds), *Management of Transboundary Rivers and Lakes,* Berlin: Springer-Verlag.

Tvedt, T., 2004. *The river Nile in the age of the British.Political ecology and the quest for economic power*, London: I.B. Tauris.

Twumasi, Y.A. and Merem, E.C., 2007. 'Using remote sensing and GIS in the analysis of ecosystem decline along the River Niger Basin: the case of Mali and Niger', *International Journal of Environmental Research and Public Health,* Vol. 4, No.2.

United Nations (UN), 1967. '1964 Agreement concerning the RNB Commission and the navigation and transport on the River Niger', *Treaty series*, Vol. 587-3, No. 8507, 25 November.

United Nations, 1984. '1980 Convention creating the Niger Basin Authority (with protocol relating to the Development Fund of the Niger Basin)', *Treaty series*, Vol. 1346, No. 22675. 13 January.

United Nations, 2007. *Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries*, Framework Convention on Climate Change.

United Nations, 2007. *Security Council holds first-ever debate on impact of climate change, on peace, security, hearing over 50 speakers*, United Nations 5663 meeting, Department of Public Information New York, www.un.org/press/en/2007/sc9000.doc.html, Accessed: 10 February 2016.

United Nations, 2013. 'Water Security and the Global Water Agenda: A UN-Water Analytical Brief', *Institute for Water, Environment and Health,* United Nations University, Ontario.

United Nations, 2015. *International Migration Report*, Economics and Social Affairs. www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/migrationreport2015_highlights.pdf, Accessed: 20 July 2016.

United Nations Department of Economic and Social Affairs (UNDESA), 2013. 'Water for Life Decade: Water Scarcity', *International Decade for Action Water for Lifer 2005−2015*, www.un.org/waterforlifedecade/scarcity.shtml, Accessed: 23 January 2014.

United Nations Department of Economic and Social Affairs, 2014. *International decade for action: Water for life 2005−2015*, http://www.un.org/waterforlifedecade/transboundary_waters.shtml, accessed: 25 August 2016.

United Nations Department of Economic and Social Affairs, 2015. *International decade for action water for life 2005−2015*, www.un.org/waterforlifedecade/water_cities.shtml, accessed: 01 March 2016.

United Nations Environmental Programme (UNEP), 2006. 'Environment, Sustainable Development and the Nile River Basin', *Education for Sustainable Development Innovations*, MESA University Partnership.

United Nations Environmental Programme, 2010. *Africa Water Atlas*, Division of Early Warning and Assessment (DEWA), Nairobi, Kenya: United Nations Environment Programme.

United Nations Environmental Programme (UNEP), 2012. '*Renewable Resources and Conflict*, Toolkit and Guidance for Preventive and Managing Land and Natural Resources Conflict, the United Nations Interagency Framework Team for Preventive Action.

The United Nations Interagency Framework Team for Preventive Action (UNIFTPA). 2012. Renewable resources and conflict. Toolkit and guidance for preventing and managing land and natural resources conflict.

United Nations (UN) Press Release, 2001. 'Secretary-General asks United States geographers to work with him to tackle climate change problems, Environmental degradation and Sustainable development', *Press Release* SG/SM/7732, 01 March, www.un.org/News/Press/docs/2001/sgsm7732.doc.htm, accessed: 06 February 2014.

United Nations Watercourses Convention. 2017. The UN Watercourses Convention: History and Prospects. http://www.unwatercoursesconvention.org/faqs/. Accessed: 08-08-2017.

Urdal, H., 2005. 'People vs. Malthus: Population pressure, environmental degradation and armed conflict revisited', *Journal of Peace Research*, Vol 42, No 4.

Urdal, H., 2008. 'Population, Resources, and Political Violence: A subnational study of India, 1956-2002', *Journal of Conflict Resolution*, Vol. 52, No. 4, August, Oslo, Norway: Center for the study of Civil War The International Peace Research Institute.

Van der Molen, I. and Hildering, A., 2005. 'Water: cause for conflict or co-operation?' in A. Petersen and J.P. Pardo-Guerra (eds), *Journal on Science and World Affairs*, Vol. 1, Remember your Humanity, International Student / Young Pugwash Yearbook 2005, ISYP

Van der Zaag, P. and Savenije, H.G., 2000. *Towards improved management of shared river basins: lessons from the Maseru Conference*, Water Policy 2.

Van Rensburg, D., 2014. 'South Africa and Namibia ensuring enough irrigation water together', *The Water Wheel*, Water Resource Management, November/December.

Van Schaik, L. and Dinnissen, R., 2014. 'Terra Incognita: Land Degradation as underestimated threat amplifier', *Clingendael Report*, Netherlands Institute of International Relations.

Van Wyk, J., 2010. 'The African Union's response to climate change and climate security', in D.A. Mwiturubani and J. Van Wyk (eds), *Climate change and natural resources conflicts in Africa*. Institute for Security Studies Monographs, Issue 170.

Veilleux, J.C., 2013. 'The Human Security Dimensions of Dam Development: The Grand Ethiopian Renaissance Dam', *Global Dialogue*, Vol. 15, No. 2. Summer/Autumn.

Verhoeven, H., 2013. *China shifts power balance in the Nile river basin. China Dialogue*, 4 July, www.chinadialogue.net/article/show/single/en/6178-China-shifts-power-balance-in-the-Nile-river-basin, accessed: 17 February 2015.

Vinogradov, S., Wouters, P and Jones, P. 2003. Transforming potential conflict into cooperation potential: The Role of International Water Law. University of Dundee, UK. SC-/WS/67.

Vlachos, E. 2013. Hydrodiplomacy and Dispute Resolution in Private Water Resources Conflicts. In. Ganoulis, J., Duckstein, L., Literathy, P and Bogardi, I (Eds.). *Transboundary Water Resources Management: Institutional and Engineering Approaches. NATO ASI,* series 2, Vol. 7.

WalesOnline, 2012. Treat water like oil and sell it for profit, says ex-DwrCymru Chief. 10 April. http://www.walesonline.co.uk/news/wales-news/treat-water-like-oil-sell-2047334. Accessed: 30-07-2013.

Waslekar, S., 2013. 'Blue Peace for the Nile', *Strategic Foresight Group Report*. March, Mumbai.

Water Policy Program, 2002. *Survey of Nile System Pollution Sources*, Report No.64, September.

Waterbury, J., 1979. *Hydropolitics of the Nile Valley*. NewYork: Syracuse University Press.

Waterbury, J., 2002. *The Nile basin national determinants of collective action*. New Haven: Yale University Press.

Waterwiki.net, 2009. *Niger Basin Authority*. 17 October, http://waterwiki.net/index.php?title=Niger_Basin_Authority, accessed: 23 February 2017.

Weiner, M, and Russell, S. S. 2001. *Introductionin Demography and national security.* New York and Oxford, UK: Berghahn.

Werz, M. and Conley, L., 2012. 'Climate Change, Migration, and Conflict Addressing complex crisis scenarios in the 21st Century', *Center for American Progress*, January.

Wetlands International Africa, 2012. *The RNB and its deltas*. http://africa.wetlands.org/Whatwedo/NigerRiverandDeltas/tabid/2944/language/en-GB/Default.aspx, accessed: 01 February 2017.

Wettestad, J., 1999. *Designing effective Environmental Regimes*, Northampton, MA, Edward Elgar Publishing Limited.

Wiebe, K., 2001. 'The Nile River: Potential for Conflict and Cooperation in the Face of Water Degradation', *Natural Resources Journal*, Vol. 41, No. 3, Summer.

William, E.D.1996. Environmental Scarcity as a cause of violent conflict.School of Advanced Military Studies, United States Army Command and General Staff College. Fort Leavenworth: Kansas.

Williams, K.R. and Gemenne, F., (eds), 2016. *Organisational Perspective on Environmental Migration*, New York.

Wirkus, L. and Böge, V., 2006. 'Transboundary water management on Africa's international rivers and lakes: current state and experiences', in *Transboundary water management in Africa: Challenges for development cooperation*.

Wolf, A.T., 1996. 'Middle East Water Conflicts and Directions for Conflict Resolution', *Food, Agriculture, and the Environment Discussion Paper 12,* March.

Wolf, A.T., 1998. *Conflict and cooperation along international waterways*, Water Policy 1.

Wolf, A., Yoffe, T.S.B. and Giordano, M., 2003. *International waters: identifying basins at risk,* Water Policy 5.

Wolf, A., 2005. 'Hydropolitical Vulnerability and Resilience: Series Introduction', *Hydropolitical Vulnerability and Resilience along International Waters: Africa, Nairobi*, United Nations Environment Programme (UNEP).

Wolf, T.A. and Newton, J.T., 2008. *Case Study of Transboundary Dispute Resolution: the Nile waters Agreement*, Institute for Water and Watersheds, www.transboundarywaters.orst.edu/research/case_studies/Nile_New.htm, accessed: 04 June 2014.

World Bank, 2007. *Supervision Mission Report*, Lesotho, Jan/Feb.

World Bank, 2007. *Implementation Completion and Results Report (IBRD-43390) on a Loan in the Amount of US$45 Million to the Lesotho Highlands Development Authority for Lesotho Highlands Water Project* – Phase 1B, Report No. ICR 168, Washington DC: World Bank,

http://documents.worldbank.org/curated/en/556021468054665427/text/ICR168.txt, accessed: 02 November 2016.

World Bank, 2008. 'Nile Basin Initiative Institutional Strengthening Project – Project Information Document', *InfoShop – World Bank, Report* No. AB3787.

World Bank, 2015. 'In the Niger Basin, Countries Collaborate on Hydropower, Irrigation and Improved Water Resource Management', *The World Bank*, 4 March, www.worldbank.org/en/news/feature/2015/03/04/niger-basin-countries-collaborate-on-hydropower-irrigation-and-improved-water-resource-management, accessed: 23 February 2017.

World Health Organization (WHO). 2017. Climate change and Human Health. http://www.who.int/globalchange/ecosystems/desert/en/. Accessed: 14-08-14.

World Hunger, 2016. 2016 World hunger and poverty facts and statistics. www.worldhunger.org/2015-world-hunger-and-poverty-facts-and-statistics/, accessed: 01 March 2017.

Worldometers, 2016. *Southern Africa Population 2016*, www.worldometers.info/world-population/southern-africa-population/, Accessed: 12 October 2016.

Worldometers, 2017a. *Nigeria Population*, www.worldometers.info/world-population/nigeria-population/, accessed: 01 March 2017.

Worldometers, 2017b. *Mali Population*, www.worldometers.info/world-population/mali-population/, accessed: 01 March 2017.

Worldometers, 2017c. *Niger Population*, www.worldometers.info/world-population/niger-population/, accessed: 01 March 2017.

Xercavins, J., 1999. *Carrying capacity in East Sub-Saharan Africa: A Multilevel integrated assessment and a sustainable development approach*, Doctoral Thesis, 1September.

Yacob, Y., 2004. 'From UNDUGU to the Nile Basin Initiative: An enduring exercise in futility', *Addis Tribune*, 23 January 2004. http://allafrica.com/stories/200402200793.html, accessed: 24 October 2013.

Yacob, Y., 2014. 'Blue Nile sub-basin legal regime in historical context: Colonial treaties', *Ethiomedia*, 22 February, www.ethiomedia.com/14news/5701.html, accessed: 23 November 2016.

Yihdego, Z., 2013. 'The Blue Nile dam controversy in the eyes of international law', *Global Water Forum Discussion Paper 1326*. University of Aberdeen, United Kingdom.

Yimer, M., 2015. 'The Nile hydro politics; A historic power shift', *International Journal of Political Science and Development,* Vol. 3, No. 2, February.

Yoffe, S. B and Wolf, A. T. 2002. Water, Conflict and Co-operation: Geopolitical Perspectives.October.http://www.transboundarywaters.orst.edu/publication/geographical_perspectives/. Accessed: 04/09/2013.

Young, O.R. 1986. 'International regimes: Toward a new theory of institutions', *World Politics*, Vol. 39, No. 1, October.

Young, O. R. 1999. The Effectiveness of International Environmental Regimes: Causal Connections and Behavioral Mechanisms. Cambridge: MIT Press.

Young, O.R., 2011. 'Effectiveness of international environmental regimes: Existing knowledge, cutting-edge themes, and research strategies', in *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, Vol. 108, No. 50.

Youssef, P., 2016. 'Violence around Lake Chad is leading nowhere – just deepening divides', *The Guardian*, 30 June, www.theguardian.com/global-development/2016/jun/30/violence-around-lake-chad-is-leading-nowhere-just-deepening-divides, accessed: 23 February 2017.

Zabarenko, D., 2011. ‘Water use rising faster than world population’, *Reuters*, 25 October, www.reuters.com/journalists/deborah-zabarenko, accessed: 11 August 2016.

Zaki, M., 2014. ‘Nile Basin Countries to negotiate Entebbe Agreement’, *Daily News Egypt*, 28 May, http://sodere.com/profiles/blogs/nile-basin-countries-to-negotiate-entebbe-agreement, Accessed: 20 May 2014.

ABSTRACT AND KEYWORDS

Keywords

Africa

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Abstract

For much of the past century, the hydropolitical landscape of African transboundary river basins has been affected by water scarcity. The analysis of hydropolitics is referred to here as the politics of water, which symbolises the most complex relations and interactions between states that share river basins. According to Elhance (2000:202), such hydropolitics is a function of two variables: the rate of change in the hydrologic system and the institutional capacity to absorb that change.

The United Nations (UN) identified the Orange-Senqu, the Nile and the Niger River basins, along with six other African river basins susceptible to potential water-induced

conflict, as being at risk of tensions and/or conflict. The discourse and interest of this study in water as a potential source of conflict concentrates largely on the Orange-Senqu, the Nile and the Niger river basins. This study takes a comparative perspective of these transboundary river basins and outlines foreseeable transboundary river challenges for regional security, considering the impact of environmental scarcity.

The selection of these basins is prompted by these regions being marked by serious environmental challenges that are detrimental to combustible hydropolitics over such shared water resources. Moreover, these cases are situated in three different regions and are aligned to different already functional regimes, with protocols and/or charters on shared watercourse. As such, they make for a helpful comparative case study analysis. These cases provide ideal and fascinating examples of the links between climate variability and change, water resources, human security, conflict, adaptation and regime capacity.

The transboundary Orange-Senqu River Basin, located in the Southern African region is, after the Congo and the Zambezi river basins, the third largest river catchment in Africa. The basin stretches over four countries that includes all of Lesotho, a large portion of South Africa, southern Namibia and southwestern Botswana. The Orange-Senqu basin faces challenges of water scarcity due to soil erosion, wetland degradation, pollution, irrigation, mining, industries, population growth, power generation and domestic consumption. The unequal distribution of freshwater resources is also a fundamental factor posing a threat to the economic and social development of the Southern African region

The Nile River Basin (NRB), located in the region of North East Africa is an international river shared by eleven riparian countries. These are Burundi, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania, Uganda, the Democratic Republic of the Congo (DRC), Sudan and South Sudan. This makes it the world’s longest river at about 6,700km or 4,100 miles. The NRB faces considerable challenges including rapid population growth, water scarcity as the NRB countries are known for their arid and semi-arid conditions, poverty, environmental degradation and uneven distribution of the Nile waters. The NRB is centrally challenged by disputes over the unequal use of water between upstream and downstream riparian countries

The Niger River, located in West Africa, is the third longest river in Africa after the Nile and Congo, flowing for 4,200 km and extending into 10 countries (Guinea, Côte d'Ivoire, Mali, Burkina Faso, Algeria, Benin, Niger, Chad, Cameroon and Nigeria). The Niger River Basin also faces challenges of population growth (with a total population of approximately 100 million and a growth rate of around 3%), agricultural run-off, oil production (the source of a host of environmental issues) and climate change, among other challenges.

Regarding the institutions and institutional capacity required to promote cooperation among member countries and ensure the integrated development of resources, the study focuses on the Orange-Senqu River Commission (ORASECOM), the Nile Basin Initiative (NBI), and the Niger Basin Authority (NBA).