International Water Management in the Zambezi River Basin

A Historical-Geographical Analysis

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Dedication

Dedicated to my loving and supporting wife Jessica and my two wonderful sons,

Matamando and Mayankho

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This study on international water management in the Zambezi River Basin has been an exciting journey in my life. I have worked closely with technocrats from different and diverse disciplines, both public and private institutions, local and international institutions, donor agencies, the university and research institutions, both in the Nordic countries and Southern Africa. This type of professional interaction has enhanced my understanding of the relationship between geographic and social factors in the shaping of hydro-politics in the Zambezi River Basin.

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ABSTRACT

This study reconstructs the evolution of international water management in the Zambezi River Basin in a long-term historical and geographical perspective. The study explores water management by locating it in both a specific hydrological and historical context, and by focussing on hydropower developments and dams for two reasons. Since such undertakings have been controversial and contentious in modern history and they have particular consequences for other types of international and national river management practices, such a focus is thought fruitful.

The study addresses four central objectives that are interconnected and are of theoretical and empirical interest. The first objective is to explore how the attempts to control the Zambezi River particularly through hydropower dams, have influenced the general management of water resources in the basin. The second objective is to explore how the notion of riparian rights has influenced the control and use of the Zambezi River and its important tributaries within the individual basin states considering that the Zambezi River Basin is an internationally shared water resource. The third objective is to explore the underlying reasons why the basin states sought coordinated management of the Zambezi River as they have concluded several basin and regional treaties to manage international waters since the mid-1980s. Lastly, the study aims to explore the ways in which major proposed water engineering projects in the Zambezi River Basin will shape developments in this region in relation to treaties that have been concluded in the basin and the region, as climate changes, and new global forces emerge, such as China.

By collecting and assessing large amounts of relevant data both regarding hydrological, historical, economic and political issues in the basin, and by using different theoretical and methodological approaches discussed in the thesis, this study presents a broad, non-reductionist narrative of the history of the River Zambezi with a focus on how hydropower development changed the river and the relationship between societies and the river. More specific, it finds that the timing and mode of initiation of the big dams have had far reaching consequences for international water management in the Zambezi River Basin. The particular historical context in which the dams were implemented is important to understand and must be considered in assessments of later developments, since it helped to produce a fundamental contradiction or a mismatch in the international management of the Zambezi: Dams continue to serve interests of a particular state and sector while the international water management institutions that

have been established, have been largely fashioned for strategic political reasons. While important legal agreements have been concluded, water issues have not been central in as far as agreeing on specifics such as rights and responsibilities of the states, consideration of geographic asymmetries, side-payments and issue linkage. The thesis discusses to what extent river basin cooperation will be enhanced if incentives to the individual states are made clear for their participation in basin-wide programmes.

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List of Acronyms

ABOM	Agreement Between Operating Members
ACMEN	African Minesterial Council on the Environment
CAPCO	Central African Power Company
CDC	Colonial Development Corporation
CNEEC	China National Electric Equipment Corporation
DRC	Democratic Republic of Congo
GDP	Gross Domestic Product
ELMS	Environmental Land Management Sector
EMINWA	Environmental Sound Management of Inland Waters
Ex-Im	Export-Import
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FLS	Front-Line State
GHG	Greenhouse Gases
GNP	Gross National Product
HEP	Hydro-Electric Power
IMF	International Monetary Fund
IBRD	International Bank of Reconstruction and Development
IFI	International Finance Institution
IGMOU	Inter-governmental Memorandum of Understanding
IPCC	Inter-governmental Panel on Climate Change
IRENA	International Renewable Energy Agency

ITHEPC	Inter-Territorial Hydro-Electric Power Commission
IUMOU	Inter-utility Memorandum of Understanding
IWRM	Integrated Water Resources Management
JCC	Joint Commission of Cooperation
KW	Kilowatt
MENA	Middle East and North Africa
MW	Megawatt
OAU	Organization of Africa Unity
OMS	Operating Memorandum Status
PCC	Permanent Commission of Cooperation
PJCC	Permanent Joint Commission of Cooperation
PJTC	Permanent Joint Technical Commission
PJWC	Permanent Joint Water Commission
PSDMP	Power System Development Master Plan
RBO	River Basin Organization
RENAMO	Resistência Nacional Moçambicana
RSA	Republic of South Africa
SADC	Southern Africa Development Community
SADCC	Southern Africa Development Coordinating Conference
SAP	Structural Adjustment Programme
SAPP	Southern Africa Power Pool
SOE	State-owned Enterprise
UDI	Unilateral Declaration of Independence

UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNITA	National Union for the Total Independence of Angola
US	United States
WESTCOR	Western Corridor
WSSD	World Summit on Sustainable Development
ZACPLAN	Zambezi River Action Plan
ZACPRO	Zambezi River Action Project
ZAMCOM	Zambezi Watercourse Commission
ZAMSTRAT	Integrated Water Resources Management Strategy for the Zambezi Basin
ZANLA	Zimbabwe African National Liberation Army
ZESA	Zimbabwe Electricity Supply Authority
ZESCO	Zambia Electricity Supply Commission
ZIMCC	Zambezi Intergovernmental Monitoring and Co-ordinating Committee
ZIZABONA	Zimbabwe Zambia Botswana Namibia
ZRA	Zambezi River Authority

Chapter one

Introduction

This study is organised around four central objectives that reflect both theoretical and empirical issues of far-reaching importance and that at the same time aim to bring to the surface the evolution of international water management in the Zambezi River Basin.

The first objective is to explore how the attempts to control the Zambezi River particularly through hydropower dams, have influenced the general management of water resources in the basin. The study explores water management by focussing on hydropower developments and dams for two reasons; such undertakings have been controversial and contentious in modern history and they have particular consequences for other types of international and national river management practices. Critics - including the World Commission on Dams report released in November 2000 - acknowledge that while dams, especially large dams, may be flawed, they are still a necessary development (see Scudder 2000; Scudder 2005; WCD 2000). The second objective is to explore how the notion of riparian rights has influenced the control and use of the Zambezi River and its important tributaries within the individual basin states considering that the Zambezi River Basin is an internationally shared water resource. The third objective is to explore the underlying reasons why the basin states sought coordinated management of the Zambezi River as they have concluded several basin and regional treaties to manage international waters since the mid-1980s, on a background where available literature and international water discourses in Southern Africa show that international water cooperation in the Zambezi River Basin has generally been weak (see Chenje 2000; Chenje 2003; Wolf et al. 2003; Kirchhoff & Buckley 2008). Lastly, the study aims to explore the ways in which major proposed water engineering projects in the Zambezi River Basin will shape developments in this region in relation to treaties that have been concluded in the basin and the region, as climate changes, and new global forces emerge, such as China. By addressing these objectives within a long-term historical-geographical perspective, this study will give additional perspectives and present some new data and thus complement the growing literature on water management in the Zambezi River Basin (Chenje 2000; Chenje 2003; Scudder 2000; Tumbare 2000; McGregor 2005; World Bank 2010).

This study is based on the conviction that to understand the politics of international river basins, including the Zambezi River Basin, one has also to understand the geography and hydrology of the river, and how the historical development of river management has been influenced by such geographical factors and at the same time impacted geographical and hydrological conditions. The Zambezi River Basin is therefore here approached not only as a constructed social space, but as a river basin shaped by physical geography and the history of the river and its utilization in the long term. Comprehensive understanding of past and present water-society relationships within the Zambezi River Basin is as such deemed necessary in order to develop models of future water availability and utilization as well as drafting effective and adaptive water management strategies to better respond to emerging water related issues in the basin. These kinds of perspectives are pertinent now as the different basin states transform, people's perceptions change and future water availability becomes increasingly uncertain.

This historical-geographical study of the Zambezi Basin is also thought to contribute to the general literature on international river basin management. The world's 263 international river basins account for 60 per cent of runoff globally (see Conca et al. 2003; Giordano et al. 2013, Dinar et al. 2007). As many as 145 countries in the world are part of international river basins (Dinar et al. 2007). While the African continent constitutes the largest share of land located in international river basins, it has the least number of international water treaties (Dinar et al. 2007). Moreover, less than half of the world's international river basins have international water agreements. With the operationalization of the Zambezi Watercourse Commission in 2014, the Zambezi River Basin forms part of the river basins that have international river basin organisations in place, which globally constitute less than a quarter of all the international basins (see Dombrowsky 2007).

1.1 The Study Unit: The Zambezi River Basin

In line with what has been underlined above, there is at this stage a need for a more detailed description and delineation of the study unit that will have bearing on the study's analysis. The Zambezi River which was referred to as "God's highway into Africa" by Dr. David Livingstone, a Scottish missionary and explorer, is the only large river system in Africa that drains water into the eastern coast of the continent. The basin is the fourth largest of Africa's 60 international river basins after the Congo, Niger and Nile River basins (see Dinar et al. 2007). In modern history, the Zambezi River Basin has been recognised as the best natural capital of the Southern Africa Development Community (SADC). The basin defines the region's economic activities that comprise agriculture and forestry, manufacturing and mining, conservation and tourism, as well as scientific research and monitoring[1] (Chenje 2000). The basin provides a home to some 38.4 million people in the eight basin states that include Malawi, Tanzania, Mozambique, Zambia, Zimbabwe, Botswana, Namibia and Angola (Chenje 2000).

Approximately 2,494 km long, the Zambezi River draws its waters from a catchment area of around 1,193,500 square kilometres[2] (Davies 1986). The upper Zambezi River extends from the river source in North West Zambia and East Angola and flows through the Caprivi Strip up to the Victoria Falls. The middle Zambezi extends from the foot of the Victoria Falls and flows through a series of gorges including the

[1] Foreword of the State of the Environment Report for the Zambezi Basin by former President of Mozambique and Chairman of SADC, J. Chissano.

[2] Calculations by Balon & Coche 1974

Batoka, Mupata, Kariba and Cahora Bassa. The lower section of the river extends from the foot of the Cahora Bassa to the delta on the Indian Ocean Coast (Davies 1986).

Hydropower development and hydropower dams are directly and indirectly influenced by factors such as annual and seasonal discharges (which in the case of the Zambezi solely depends on precipitation), flow variations, velocities, geological opportunities for dam building, and energy potential in the running water among others (see Hamududu & Killingtveit 2012, Kumar et al. 2011). These parameters in the basin affect the technical potential of hydropower development signifying that hydropower technical potential as well as distribution of water availability in spatial and temporal terms is high in certain areas and states (see AfDB 2011). These have implications for international water management.

Since the source of water for this major river is rainfall, (unlike rivers like the Rhine, the Garonne, the Ganges for instance that also receives melting water from glaciers), the Inter-tropical Convergence Zone (ITCZ) which mainly influences rainfall patterns in the basin creates distinctive dry and wet seasons (see World Bank 2008). In addition, rainfall availability in the region exhibits spatial variations, with the northern and eastern parts of the basin receiving more rainfall and a progressive decrease in the southern and western parts of the basin (Tumbare 1999). The northern parts of Zambia receive as much as 1,200 mm of rainfall on average annually compared to just around 700 mm in the southern parts of the country. On the other hand, the southern parts of Zimbabwe receive as little as 400 mm of rainfall on average every year (Mazividza, Sakala & Mukupe 2000). The basin is also characterised by a high number of tributaries in the northern parts of the basin as compared to the southern parts (Mazvidza et al. 2000). Such variations suggest that there is a significant water imbalance in the basin which according to Gleick can lead to growing tensions among riparian states (Gleick 1993). Addressing that supply imbalance will depend in part on each state's economic and political capabilities since securing adequate water is not solely limited by physical constraints (Gleditsch et al. 2004).

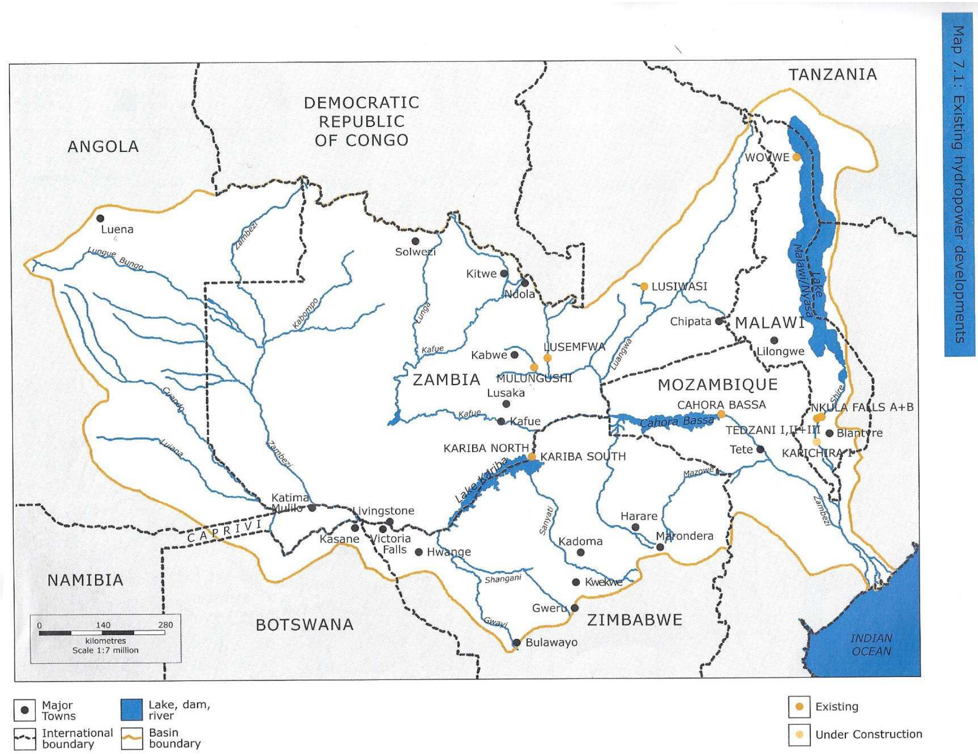

Figure 1. Map of the Zambezi River Basin
(Chenje 2000)

Zambia has the largest share of the basin, covering 41 per cent of the basin, followed by Zimbabwe at 19 per cent, Mozambique and Angola at 11 per cent each and Malawi at 8 per cent. With the exception of Botswana whose share of the basin stands at six per cent, the rest of the riparian states each have a two per cent share of the basin. About 93.2 per cent of the surface area in Malawi, the smallest basin state, lies in the Zambezi Basin, followed by Zambia and Zimbabwe at 71.7 and 64.3 per cent respectively. Consequently, over 85 per cent of the population in Malawi lives in the Zambezi Basin. In addition, due to the high population density in Malawi (standing at 105 persons per square kilometres {Chenje 2003}), the country constitutes the largest share of population living in the basin at 31 per cent. This is followed by Zimbabwe and Zambia at 29 and 22 per cent respectively (Chenje 2000). The combination of hydrologic characteristics in the basin, share size of the basin and riparian positions have all been important aspects in strategic choices in water resources development as well as international negotiations by the riparian states.

The influence of the Inter-Tropical Convergence Zone (ITCZ) on rainfall patterns in the Zambezi Basin produces distinct periods of rainy seasons with subsequent spatial and temporal variations in water availability (see Mohamed 2003). The basin is also characterised by high potential evapo-transpiration rates relative to precipitation resulting in a poor rainfall to runoff conversion ratio. The rate of evaporation in most parts of the basin is higher than precipitation. Overall, as much as 1,100 cubic km of water of the total 1,200 cubic km of the precipitation that the basin receives annually evaporates (Chenje 2000). As a result, only around 10 per cent of the precipitation in the basin is available as runoff compared to the global average of 30 per cent (Chenje 2000). These hydrologic characteristics of the region intensify the interconnectedness of the basin states as the spatial and temporal variability of water imply that exogenous water resources are significantly essential for development in several states. Exogenous water resources account for a sizeable proportion of the national water resources, especially in the countries south of the Zambezi River, to as much as 75 per cent in Mozambique and Namibia and even greater in Botswana (Black & King 2009). Interestingly, Mozambique is riparian to nine international river basins in Southern Africa, but as a downstream state in all cases (Heyns 2003). While water availability is high in the country, its downstream position makes it vulnerable since water use changes in the upstream states have the potential to affect the quantity, quality and timing of water flow in the country.

Rainfall variability is also high both inter-annually and inter-decadal, with some decades being relatively wet and others relatively dry. The general climate in the

Zambezi River Basin thus exhibits cyclic patterns. The 1970s appeared to be wetter while the 1980s and 1990s appeared to be relatively drier (Chenje 2003). Using differential mass curves for the Zambezi River main channel at the Victoria Falls and Kafue River at the Kafue Hook Bridge, Tumbare shows that the basin experienced a dry sequence between 1908/1909 and 1937/1938, a total of 30 years, an average sequence between 1938/1939 and 1947/1948, a total of 10 years, a wet sequence between 1948/1949 to 1979/1980, a total of 32 years, and a dry sequence between 1980/1981 and 1995/1996, a total of 15 years (Tumbare 2000). These inter-decadal variations suggest that the flow of the Zambezi has also varied significantly in history. With an annual average flow of 1,056 m^3/s, the maximum recorded annual flow for the Zambezi River at the Victoria Falls was 2,328 m^3/s and the recorded minimum was 442 m^3/s in the period from 1907 to 1996 (Mazvidza et al. 2000). This characteristic is also common in all the major tributaries of the Zambezi River including the Kafue, Luangwa and Shire Rivers. While flow variations have impacted different users in a variety of ways, they have generated real economic costs to the energy sector as the dry sequence since 1980s has reduced generation capacity at both the Kariba and Kafue hydro-electric power stations by as much as 45 per cent (see Tumbare 2000). Such alternating periods of dry and wet periods may also influence the nature of interstate relations as prolonged dry periods may induce conflicts (Gleditsch et al. 2004) while periods of normal rainfall, other than droughts and floods, may play in favour of more cooperation (Wolf et al. 2003).

Addressing the fluctuating hydrological conditions in the Zambezi Basin has necessitated the construction of dams by the riparian states as a key strategy to water management (see Kaniaru 2010). Dams are importantly deployed to address variations in seasonal flows and even multi-seasons in the case of big dams (Kumar et al. 2011). The need to modify the flow characteristics of the river has therefore placed dams at the core of water management to address the flow variations of the Zambezi River. The proportion of water in the Zambezi Basin, without modification, can be as much as 13 times the amount of water in the rainy season as in the dry season due to seasonal variations. Comparatively, the Congo which is considered to have much more even flow rates in Africa fluctuates in the ratio of three to one while the Nile is much more variable than the Zambezi with a flow ratio of 17 to one (Church 1968). Dams which also play a central role in regulating the river flow inopportunely contribute to high evaporation rates in the basin (Chenje 2000).

1.2 Water control and use in the Zambezi River Basin

In an attempt to modify flow characteristics in the Zambezi River Basin, some rivers have been transformed in the last 100 years from unregulated and free flowing, to regulated national and international resources. Understanding the new hydrological and hydro-political realities that have followed as a consequence of this history of water exploitation is important when exploring opportunities and challenges to international water management in the basin. What is also underlined in this thesis is the recognition of the fact that the decolonization of states in the post-colonial i.e. internalization of the basin, has placed water as an international issue (Chenje 2000; Wolf et al. 2003). The 12 mainland SADC member countries, of which the Zambezi Basin states are part, have riparian rights to 15 international river basins, when the Nile and the Congo River Basins are included (Heyns 2003; Giordano & Wolf 2003). In this context, water is undoubtedly one of the key international political issues in Southern Africa. The traditional process of using natural features, particularly water bodies, to differentiate one territory from another during the scramble for Africa provides a strong front today for international water cooperation. In other words, what was intended to separate states from one another brings those states more closely together through the need to coordinate management of international watercourses. Moreover, the eight Zambezi River Basin states are also riparian states to three or more international river basins (Heyns 2003; Sadoff et al. 2002). This means that the people in the basin as well as the whole of Southern Africa are more intrinsically connected to each other through water resources in addition to a commonly shared social and linguistic heritage.

Table 1	Renewable Water Resources			
Basin Countries	Total (km^3/ac)	Withdrawals (km^3/ac)	Withdrawals % of Total	Water 2001 (m^3/person)
Angola	184.0	0.4	0.19%	13,620
Botswana	14.4	0.1	0.97%	8,471
Malawi	17.3	0.6	3.65%	1,641[a]
Mozambique	216.1	0.6	0.29%	11,960
Namibia	17.9	0.3	1.51%	10,022
Tanzania	91.0	2.0	2.20%	2,642
Zambia	105.2	1.7	1.65%	10,233
Zimbabwe	20.0	2.6	13.05%	1,560[a]

[a] Indicates water stress (<1,700 m^3/person)

Figure 2. Water Resources in the Zambezi Basin.
(Scholes & Biggs 2004 op.cit Hirchhoff & Buckley 2008)

Both the Kariba and Cahora Bassa hydro-electric power (HEP) plants are significant hydro-engineering projects that have been developed in the Zambezi River Basin (see Scudder 2000). Nonetheless, such large-scale water projects often have wide political, social, economic and environmental implications, particularly where dams necessitate the relocation of riverine communities from their homelands (WCD 2000; Kumar et al. 2011, Scudder 2005). Moreover, river damming in one state has significant consequences for another or several more states within the basin, especially as the level of interconnectedness increases (see Kumar et al. 2011). One hypothesis is that such a high level of interconnectedness may subsequently elevate the likelihood of conflicts over water, particularly if countries lack the political will coupled with lack of financial and technical capacity to cooperate effectively (see Toset et al. 2000).

The Zambezi River Basin states have experienced extreme events in the form of floods and droughts. Some of these include the floods of 2000 that devastated the lower Zambezi Basin killing and displacing a large number of people (see Arnell 2002; Scudder 2000). The drought of 1992 was also devastating when the Zambezi River registered the lowest flows (SAPP 1997). What this means is that the occurrence of such extreme events may challenge measures that have been put in place to manage water in the basin (Gleick 1993). The observed shifting in climate patterns has important implications for the quality, quantity and timing of the flow of water resources in the basin (see Hamududu & Killingtveit 2012; Kumar et al. 2011).

Impacts of changing climate and hydrologic regimes may vary across the basin. This is because geographic and social factors have also evidently produced variations in society-water interactions both in spatial and temporal terms in the Zambezi basin. Various authors have given accounts of the Tonga people who settled in the Zambezi valley and how they interacted with their water environment and how this relation was severed through relocation in the wake of the construction of the Kariba Dam (McGregor 2005, Scudder 2000, Soil Incorporated (Pvt) Ltd et al. 2000). Thus it can only be expected that the way in which communities in the highlands utilise and relate to water, will differ from the way the communities located in the valleys relate to and utilise water. With varying geographic and geologic characteristics along the entire river course, opportunities and limitations to control and utilise water differ. In some parts, overbank flooding has been a key to sustaining the livelihood of riverine communities, where rain-fed agriculture is less viable, due to low precipitation and high evaporation rates[3]. Even at a wider scale of the basin, efforts to control and utilise water might have produced various water-society interactions both temporally and spatially.

It is also generally accepted that water demands and utilisation will only escalate in the basin corresponding to the burgeoning populations and increased economic growth (Chenje 2000; EuroConsult Mott McDonald 2008). Simultaneous with these changes is also increased uncertainty over water availability as rainfall patterns become more erratic (see Hamududu & Killingtveit 2012; Kumar et al. 2011; Kirchhoff & Buckley 2008). Projections for the water cycle in Zambezi River drawn from various climatic and hydrologic models show that due to climate change, the runoff in the Zambezi

[3] See Mandala 1990 on the agricultural system of the communities in the lower Shire valley where overbank flooding and agriculture played a key role in social organization

River Basin will likely decrease by about 30-40 per cent by 2050 (IPCC 2001). Observational records already show that Africa has been warming at a rate of 0.05 ºC per decade in the twentieth century resulting in a warmer climate than 100 years ago. Moreover, Africa has registered the warmest temperatures since 1988 (IPCC 2001). Current and future water managers therefore face significant management challenges, taking into consideration difficulties in planning for uncertainty and making water sharing agreements, which factor in those uncertainties, possible (Gleick 1993; see also Kundzewicz et al. 2008).

Only around 16-20 per cent of the available water is currently utilised by the basin states, and future projections indicate a doubling of the current figure by 2050 (Euroconsult Mott McDonald 2008). Land and water resources are in fact in ample supply at the basin level (World Bank 2008). These statistics however may suggest that water issues are insignificant in the basin particularly when also considering that water availability outstrips demand in most parts of the basin (Heyns 2003). Nevertheless, assessing water issues in this context negates water related vulnerabilities that affect livelihoods and hence social and economic development in the region. By considering the spatial variability and the seasonal nature of water availability (see World Bank 2008) coupled with lack of river regulatory works, one might then get a better perspective of how water characteristics in the basin have a significant impact on the social and economic development in the region. In addition, water supply appears to outstrip demand due to a number of factors including: limited water supply infrastructure outside towns and cities; high dependence on rainfall for agricultural productivity; and higher rural populations (69 per cent basin average) which still live on subsistence agriculture and have low access to goods and services either from public institutions or the private sector (Chenje 2000). Addressing these social-economic issues means that the demand for water and energy resources in the basin will likely increase.

	Volume of runoff in million m³	Percentage of available runoff
Total Available run off	**103,224**	**100**
Rural domestic consumption	24	0.02
Urban domestic consumption	175	0.17
Industrial consumption	25	0.02
Mining	120	0.12
Environmental/ flood releases	1,202	1.16
Irrigated agriculture	1,478	1.43
Livestock	113	0.11
Hydropower (evaporation)	16,989	16.46
Total consumptive water use	***20,126***	***19.49***

Figure 3. Water Usage in the Zambezi River Basin as a percentage of available runoff (Euroconsult Mott McDonald 2008)

The large size of the basin, including demographic, political, economic, cultural, geographic as well as hydrologic variations in the basin, also presents different countries with different opportunities and constraints with regards to water control and use (Aasand et al. 1996). The states in the north of the Zambezi River which receive more rainfall may have increased opportunity to develop hydropower while states in the south of the Zambezi River may resort to using high proportion of the available water for irrigation. Such variations can complicate sharing of the water resources equitably in the basin, particularly as water use changes and climate change take their toll. The basic argument is that such variations may lead nations to believe that "they have mutually incompatible goals when it comes to utilisation of shared water resources" (Aasand et al. 1996: 26).

The sectoral composition of water use, or in other words how water use is prioritised, within states may also influence international water relations in the basin i.e. hydropower vs irrigation vs tourism (Dinar et al. 2007). This is largely due to the interdependences or externalities in economic terms, that water creates among the users, where one water use may affect other users in a number of ways. These effects could be in the form of changes in timing of flow, quantity, and or quality of water i.e. the construction of the Kariba and Cahora Bassa Dams influencing the timing, frequency, and magnitude of floods in the lower Zambezi Valley and impacting livelihoods of the riverline communities (see WCD 2000; Scuddder 2000; Scudder 2005; McGregor 2005). Such changes may impair the water situation of some states or users since water availability goes beyond the physical term as a variety of factors can influence what is actually available (see Dinar et al. 2007). On the other hand, water-induced interdependencies, as many scholars argue, form the basis of cooperation among the riparian states (Wolf 1998; Kumar et al. 2011). By recognising and accounting for such interdependencies through basin-wide management, it is possible to widen the range of management options and increase management efficiency through elimination of duplications (Dombrowsky 2007). At the same time, basin-wide management enables identification of potential strategies and locations that yield great economic gains for the benefit of all the riparian states (see Dinar et al. 2007).

How best to share water between users and societies, or in other words, the ideas of water including water control and use, have also been dynamic over time. In other words, the understanding of water issues and how best to manage water in order to maximise gains, while at the same time protect the resource itself, has improved over recent decades. Water management has also changed from a heavily governmental affair to a more devolved, decentralised and deregulated sector (see Dombrowsky 2007). There is now a growing appreciation in water discourses around the globe of the environmental role of water as global communities strive to attain its sustainable use (see Conca et al. 2003). International watercourse law has also notably made provisions for the protection of the environment signifying changes in the water management paradigm. Water management is therefore no longer just about volumes and the deployment of technologies to move those volumes of water across the landscape. This is a considerable shift from the predominant approach in the past where the environment could be exploited by any means for the purpose of advancing human societies (Heathcote 1998). The environment is increasingly acknowledged as a legitimate user of water and therefore requiring its water share before making other allocations. This is also increasingly becoming the understanding in Southern Africa (Scudder 2000). This dynamism in water management perspectives and practices implies that some water uses that have been acceptable in the past are more controversial and highly contentious today. Dams for instance have drawn contentious debates about their overall benefits in relation to their environmental and social implications such that associated hydro-electric power projects have also become more political rather than just economical or developmental (see Scudder 2005; WCD 2000; McGregor 2005). Such global shifts in the ideas of water affect the development of water resources in the developing world, where particularly financial capacity is limited and depends on donor aid from countries where such debates are rife.

1.3 Hydropower as the main focus

This thesis centres on hydropower development as a focusing lens through which the evolution of international water management in the basin as well as future prospects can be competently explored. One advantage of analysing international water management in the Zambezi Basin from a hydropower development perspective is that such initiatives have wide political, environmental, social, hydrologic and economic implications (Kumar et al. 2011). Hydropower development often requires the construction of dams necessitating the need to secure huge capital resources and in most cases the relocation of riverine communities (WCD 2000; Kumar et al. 2011; AfDB 2011). This raises numerous technical, financial/economic and social implications that also reflect on the general development patterns and ideas of water in the basin. In addition, dams and their reservoirs have both environmental and hydrologic consequences as vegetation may be inundated during reservoir fill up, and the timing and rate of flow downstream of the dam may be significantly altered (Kumar et al. 2011, WCD 2000; Scudder 2005). Subsequently, the development of both animal and plant species in the downstream areas may be affected as changes take place in their ecosystem (Chenje 2000). The formation of reservoirs may also increase the spread of tropical diseases such as malaria (Chenje 2000; Kumar et al. 2011). Thus hydro-electric power plants, while being non-consumptive, have ecological effects. What this means for each user or riparian state may vary depending on what value a specific user attaches to it (see Dombrowsky 2007). This importantly also suggests that in international river basins, such developments, if not handled well, can lead to conflict. The underlying reason is that the rate of ecological change facilitated by dams is rapid as opposed to the gradual change that occurs as part of the natural process and therefore allowing corresponding development of institutions to address those changes (see Wolf et al. 2003). Empirical evidence also shows that most of the conflicts in international river basins are related to quantity of water and infrastructural developments such as dams (see Wolf et al. 2003).

Flow regulation intended for hydropower development by means of dams may on the other hand be vital for water supply to irrigation projects, domestic and industrial use, as well as facilitation of navigation through maintenance of a minimum required water depth (Kumar et al. 2011). Other benefits may include enhanced fisheries, and use of reservoir drawdown to facilitate multiple cropping cycles (WCD 2000; Scudder 2000). The power generated from hydro-electric power plants is also vital for economic development of the Zambezi River Basin states. This shows that hydropower projects have both positive and negative effects, and this is one reason why rendering justification of each project becomes highly political and contentious and important to reconstruct and understand. Pursing hydropower projects may already be highly political and contentious at a national level and the international aspect of the basin elevates the level of complexity to the process, particularly on those parts of the river course that lie on the border between two states (contiguous parts) - no single country can develop it without bringing the other state on board. Joint water development, while ideally desirable and advocated in some cases as a universal solution, may have significant practical limitations particularly when attempting to harmonise plans of two neighboring states in terms of both priorities and resources for the development of a particular project. In this light it becomes more understandable that the colonial-initiated Kariba Dam remains to date the only significant hydropower development jointly initiated by two countries, Zimbabwe and Zambia (Soils Incorporated (Pvt) Ltd et al. 2000; SRD 2011).

One reason for focusing on dams in this thesis is that around 80 per cent of water utilised in the basin is attributed to hydropower projects with all other uses including industrial, household, agricultural and municipal constituting the remaining 20 per cent. These statistics clearly underline the centrality of hydropower plants in overall water resources management, and thus also the potential usefulness of focusing on this aspect of river management. Since the viability of power generation requires sustaining a certain flow rate, this necessity exerts certain pressure on the development of management scenarios for the river basin as a whole (WCD 2000, Norconsult

2003). This is all the more so, since other water uses are likely to be assessed from the hydropower perspective to ensure that they do not pose any serious limitations to the smooth operations of the hydropower systems. As more hydropower initiatives have been planned for development in various states in the river basin (Chenje 2000; AfDB 2011, Chubu 2010), the resultant pressure exerted on the Zambezi River system will be even greater.

What makes this even more interesting is that up until now, most of the large hydropower dams have been single purpose in nature since their construction has been solely for the purpose of storing water for hydro-electric power generation (SRD 2011; Scudder 2000; Soils Incorporated (Pty) Ltd et al. 2000). Increased irrigation activities pose threats to hydropower sustainability due to increased water abstraction from the system as irrigation activities expand (see World Bank 2010a). The energy sector particularly, and states that have significantly invested in hydropower development may therefore be reluctant to adopt changes geared at making water sharing equitable and thus rendering such efforts equally complex. Such vested interests have already influenced how some of the regional water treaties have been negotiated, as the negotiations to establish the Zambezi Watercourse Commission showed, as the government of Mozambique made some specific demands in order to protect its developments at Cahora Bassa (Vale 2004).

Hydropower development has a strong historical legacy and thus present-day significance in the basin considering that the first ever international water development initiative involved the construction of the Kariba dam with the objective of producing electricity for supply to both Zambia and Zimbabwe. Available literature underlines how the Kariba hydro-electric power (HEP) initiative influenced subsequent joint efforts between Zambia and Zimbabwe while on the other hand laying a foundation for joint activities among the Zambezi River Basin States (Chenje 2000). This point raises the need to explore how international water management was executed in the colonial era and how in the post-colonial period it has evolved as both environmental and social conditions changed in the Zambezi Basin.

By attempting to understand both the low level and high level dynamics involved in hydropower projects, this thesis also explores water-related developments in the basin and their national as well as basin-wide political, social, economic, hydrologic and environmental implications. Since water has been acknowledged in the SADC region as an important channel for both economic and social development, it is possible to make analyses in these areas by following the water. An exploration of the developments in the basin in terms of water, particularly hydropower development, also enables the appreciation of the natural and social front in development research. Dams, for instance, cannot just be instituted anywhere on a river course or just on any river for that matter. The selection of potential dam sites depends on satisfaction of minimum natural requirements for such initiatives. In other words, dams are site-specific and as such only those sites meeting the requirements may be developed (Kumar et al. 2011; Hamududu & Killingtveit 2012). However, the mere existence of hydropower potential on a river course does not automatically translate to its development, as issues related to technical feasibility, economic viability, social implications and environmental sustainability have to be comprehensively explored before investment and development decisions can be made. For this reason, this study has carefully chosen conceptual frameworks that integrate geography and hydrology into the analysis of the historical development of society-water interaction and more specifically, of international water management in river basins.

This thesis considers both natural and social factors, i.e. basin geography and the local and regional hydrological cycles, as well as political agreements and water economies as important components in international water management. The water-society systems conceptual framework clearly articulates this position. The study argues that a failure to consider the interaction of the natural factors and the social world over time may lead to errors in understanding the true implications of geographical factors in water management regimes. While this remains the strong focus throughout this thesis, nonetheless the use of the concept of hydro-hegemony highlights some of the mechanisms in the workings of hydro-politics.

1.4 Justification of the Study

This study is carried out at a time when the need for closer cooperation among the basin states has been called for by many observers and actors, and it will therefore contribute to this on-going discussion by bringing in both a geographical-historical perspective and new empirical data about different actors perceptions of river management. Increasing climate uncertainty and its impacts on water availability (Kirchhoff & Buckley 2008) coupled with increasing water demand as a consequence of increasing urbanization, industrialization, irrigation agriculture and general economic development have rendered the aim of promoting closer cooperation among all the member states all the more important. So far, the water relations in the basin have been largely non-conflictual. This may be due to the limited development of the water resources in the basin that has probably obviated water related conflicts as the states had no real reason to engage each other in conflicts. This is particularly true when considering that water resources development for both hydropower and irrigation are still very low in Africa in general (Kumar et al. 2011; Gleick 1993; Hamududu & Killingtveit 2012).

Addressing spatial and temporal variations in water availability necessitates significant river regulatory works on the supply side of water management. It is also appreciable that in order to meet the water needs of the growing population, increased urbanisation and industrialisation as water becomes scarce, both supply side and demand side management strategies must be included. Nevertheless, on the back of low levels of water resources development (see Kirchhoff & Buckley 2008), the likely scenario in the Zambezi River Basin is that water resources will become increasingly regulated in the short to medium term with varied impacts for different sectors and basin states. In other words, supply side water management strategies will likely dominate water management processes in the foreseeable future, especially in the areas north of the Zambezi River. Depending on how such water works are implemented, some of the riparian states may be more negatively affected than others. This calls for pragmatic international water management practice, beyond just agreements, to ensure that all the riparian states are better prepared for both natural and anthropogenic hydrologic changes. This is pertinent now as 40 new potential hydropower plants have been identified (Chenje 2000) and some of those plants are either under development or are in advanced stages of planning. Developing further hydro-electric power plants will lead to stockpiling of significant quantities of water in reservoirs thereby increasing alteration of river flows, as well as potentially increasing evaporation in the basin.

The above scenario calls for increased levels of international water cooperation in the basin. Currently, the levels of water cooperation in the basin do not reflect the situation on the ground. This reality may be problematic as rapid changes in the physical environment that are not matched by institutional developments may increase the likelihood of conflicts (Wolf et al. 2003). The question therefore becomes why the weak international water cooperation in the basin? It is a question of tough political or economic environment, or lack of political will? Is it a question of lack of technical capacity and resources or that from the minds of policy makers, the situation is not worrying to warrant an urgent response? These are many questions which certainly can generate many answers. Several authors have indeed written on the water politics and resource management in the Zambezi. These authors include among others Nakayama (1999, 2003), Chenje (2000; 2003); McGregor (2005); Maluwa (1992) etc. Many authors have also written on these issues in Zambezi as part of Southern Africa water issues in general. Other detailed studies include consultancy reports on specific issues such as dam synchronization (SRD 2011) or developing water resources management strategies for the basin (EuroConsult Mott McDonald 2008). While these writings have been informative, inherent weaknesses have been that some of the works have been very issue specific, sector specific, or very broad where many issues are discussed but not necessarily linked together. For some, this is understandable since they were not pushing for a particular scientific framework for analyzing the issues. This study was therefore developed for these particular reasons, an attempt to address the gaps in knowledge that previous studies have not adequately addressed or completely ignored.

The issues presented in this introductory chapter make it clear that attempting to understand the current control and use of water as well as trends in international water management in the Zambezi River Basin as such requires a historical and geographical analysis. Not only is it important to establish the genesis of such relations but its analysis also provides opportunities to explore challenges and opportunities in international water management as well as the influence of power dynamics in international institutions in the basin. While the main focus of the study is hydropower projects or developments, this is not a study solely on hydropower development and therefore does not mirror other sector specific studies that have been carried out in the basin. The study only uses hydropower projects, for reasons already provided earlier in this chapter, as a mechanism for exploring transitions in water relations and developments in the basin. The nature of hydropower projects also fitted very well with the overarching theoretical framework of this study, water-society systems[4] and as such enabled the study not to be social-centric or nature-centric in approach. While many different issues are addressed in this study, this thesis also differs with those previous studies that are more general in approach since the thesis attempts to highlight interconnections between politics, economics, technology developments, climate and hydrology, international law and globalization that have contributed to the current status of the international water cooperation in the Zambezi River Basin.

[4] Detailed discussions in chapter two

1.5 Approach and Methodology

In line with the water-society system approach and the perspective of the long-term which it encourages, this thesis collects historical data, hydrological and geographical data, and social data. As a natural element, water availability both in quantitative and qualitative terms can be adeptly analysed using natural science data i.e. precipitation data and runoff patterns. This kind of data may also be crucial to establishing an understanding of spatial and temporal variations in water availability and how these impact policy development on different scales. However, natural science data cannot alone explain why and how water management institutions are developed and evolve, and importantly how water resources are controlled and used. Moreover, how societies interact with water and how water is perceived, valued, prioritised and utilised varies among individuals as well as societies and as such requires a different kind of data for analysis. In addition, changes in water availability and flow regimes cannot also be explained by natural factors alone since the hydrologic cycle continues to be increasingly impacted by human activity in the landscape (Arnell 2002). This means that how water is managed in any particular basin is a product of both natural and social factors which can only be comprehensively explored using a wide array of data from different social science and natural science disciplines.

The concept of water-society systems and its three interconnected analytical layers as the water's natural (physical and chemical) form and behaviour; the anthropogenic or human-induced changes in the movement and manifestation of water across the landscape; and how water is ascribed different meanings by different groups of people and also how water symbolises different things to different people in both time and space should cater for an analysis and a collection of data that are inclusive and non-reductionist.

The entry point to the study of international water management in the Zambezi River Basin therefore was the collection and analysis of geographical and hydrological data as part of the first layer of analysis in water-society systems. In order to be able to capture these characteristics and describe the basin as the chosen historical-geographical arena various numerical data such as precipitation data, flow data, temperature data and evaporation rates, size of the basin, number of riparian states and their position as well as other climatic data was collected. The importance of this first layer of analysis is firstly to reinforce the argument that basins differ from each other in geographic characteristics such as size, climate, physical and environmental conditions. River basins of course also differ in social characteristics such as water use patterns, institutional arrangements, power dynamics as well as historical developments and relationships (see Biswas 2008). Secondly, this data formed the foundation for analysis at the second and third layers of water society systems.

Care was taken to ensure that numerical data used is what is generally accepted in the region as correct and what is used normally in analyses. Some of this data is from primary sources i.e. feasibility study reports, consultancy reports, annual reports for water institutions and power companies. Some of the data has come from secondary sources. However, these secondary sources quote primary data obtained from government departments, regional institutions such as the Zambezi River Authority, power corporations and others. This data is also what is generally used by most authors. Not only was most of this data cross-referenced but triangulation was also used to test the validity of the data and denote where there were inconsistencies particularly from sources that were not peer reviewed. Some of the important secondary sources include the World Bank, Southern Africa Development Community (SADC), the United Nations, renowned scholars and others. Collecting this data also necessitated visitation of national archives, utilisation of reputable journals and numerous books on water resource management and other related fields such as climate change, political ecology, and environmental management among others.

Regarding anthropogenic or human-induced changes in the movement and manifestation of the Zambezi in different countries and regions, data on dams and other engineering waterworks were solicited from the basin countries. However the data on dams was largely limited to the major dams due to their impact on hydrological characteristics of the Zambezi River System (see Kumar et al. 2011). The dams mainly in focus are the Kariba Dam on the border between Zimbabwe and Zambia and Cahora Bassa Dam in Mozambique, both on the Zambezi River main channel. These dams were purposefully selected first and foremost for their significant social and ecological implications and secondly because of where and why they were developed i.e. the border between Zambia and Zimbabwe and therefore requiring joint development by the two countries, or the case of Cahora Bassa which was developed with the intention of providing power to another country other than Mozambique itself. Their international nature from the onset was deemed to provide a good avenue for assessing international water relations in the basin and how such relations have progressed with dynamic changes in local, regional and global politics, environment, social issues, economies and climate.

Most of the data on dams and other engineering water works were taken from written sources, like feasibility studies, a number of project and planning documents, power corporations' reports, consultancy reports, government documents, newsletters and bulletins, national dailies newspapers, journal articles and published and unpublished books among others. Some notable sources of data also included the World Bank, International Monetary Fund (IMF), Southern Africa Development Community, Southern Africa Power Pool, and the Zambezi River Authority (ZRA). Data was also collected on individual irrigation projects, navigational uses, both old and proposed, and general water use statistics in the basin. To better appreciate the anthropogenic or human induced changes to the water system in the Zambezi, above mentioned data collection methods were supplemented by two field visits to the Zambezi River Basin, including the Kariba Dam, Cahora Bassa in Mozambique and the newly constructed river port on the Shire River in Malawi between September and November in 2010 and between June and August in 2011.

Even though the Zambezi River Basin covers eight sovereign countries, the study itself was geographically limited to four countries including Malawi, Mozambique, Zambia and Zimbabwe. This was a deliberate choice, partly due to time constraints for a PhD study but also since these are the only countries where hydropower has been developed in the Zambezi River Basin. Most of the field-study period was spent in Zambia and Malawi because of their on-going water related projects during the study period that had wider implications for several of the basin states. The proposed Shire-Zambezi Waterway project by the Malawi Government and the way it was initiated had the potential to complicate political relations between Malawi and Mozambique and thereby strain cooperation in other important project activities such as power-interconnection. On the other hand, Zambia, with its ambitious power sector development master plan, was engaged in several hydro-electric power initiatives with the Chinese financial aid. This has the potential to significantly change the hydrology or how water is running in the landscape and subsequently altering the hydro-politics in the basin. The final level of data collection was concerned with gathering information about how the river was ascribed different meanings by different groups of people and also how water symbolises different things to different people in both time and space, i.e. cultural construction and filtration of water when water is both a natural resource and social good (Tvedt 2015).

Various theories particularly related to conflict and cooperation over water were selected and explored to provide a basis for understanding the evolution of international water management in the Zambezi River Basin, such as the concepts of strategic interaction and hydro-hegemony. These were used in exploring issues of regime formation in international river basins with hydro-hegemony theory being primarily used to analyse issues of power and hegemony in regime formation and sustenance and the concept of strategic interaction to explore issues of institutional linkages, side payments and others. The thesis is also concerned with international water allocation theories, sovereignty and nationalism, international watercourse law and realism and liberalism in international relations studies, concepts drawn from different disciplines.

Using the approach articulated in water-society systems, data collected was then used to address the objectives of this study. Addressing all the four objectives of the study necessitated placing the study in a historical-geographical perspective. For instance addressing objective number one i.e. how attempts to control the Zambezi through hydropower dams have influenced management of water resources in the basin, required not only data on anthropogenic and human induced changes in the Zambezi River Basin but also geographic data of the basin to explore the natural context in which such changes have taken place as well a wide range of social data to explore the social, economic and political context of such developments i.e. how water and its development has been socially mediated in the basin. Addressing objective number one also meant that data collected at all three levels of the water-society system was necessary to produce any meaningful explanations.

The fact that hydropower constitutes the largest single water use in the basin cannot be duly explained by either, hydrology and geography of the basin on one side, or by politics, economics and other social phenomenon on the other alone. After all, it is in general argued that the larger proportion of water used by the agricultural sector, the less developed the country (Dinar et al. 2007), and water use statistics in Africa as a continent reflect this argument. Moreover, only 25 per cent of the 45000 dams around the world are for hydropower purposes (Kumar et al. 2011). The fact that hydropower development constitutes the largest share of water by far in the Zambezi basin may thus only be understood through a wide set of data obtained from various sources. The thesis as such used both qualitative and quantitative data, and this was considered important due to its policy implications (see Brannen 2004).

Addressing objective number two and thus the concept of riparian and its implications on water use in individual basin states benefited significantly from text analysis and discourse analysis guided by various theories that have been used in this thesis to render scientific explanations to the developments. Regional treaties and protocols, SADC regional strategic plans, national policies and development plans, growth and development strategies, communiques, newsletter and newspaper articles, journal articles and books, archival material and other unpublished materials were analysed to understand how the states in the Zambezi have dealt with the concept of riparian in their national planning and development of water resources.

Addressing objective number three and that is why the basin states sought basin-wide cooperation, discourse and text analysis was primarily utilized. This is mostly data collected at the third layer of water-society systems conceptual underpinning. Nevertheless, such data alone would not suffice to provide explanations on the evolution of water management without exploring other dimensions like hydrology and geography as well as anthropogenic changes in the basin. This therefore means that just as objective number one, addressing objective number three required collection and analysis of data at all the three levels of the water-society system concept.

Addressing objective number four and that is assessing the ways in which proposed water engineering projects in the Zambezi River Basin will shape developments in the region in line of concluded treaties and agreements, in the face of climate change and new global forces, data collected at all three levels in the water society system was instructive. The focus here was on anthropogenic changes to the water system i.e.

hydropower projects, irrigation schemes, or waterways and how these changes both potentially impact on the geography of the basin and also water management institutions and their mandates in the basin.

Particularly for this objective, data collected from text was supplemented by aforementioned field trips or study visits, so as to better understand the location and political and symbolic importance of these massive water control undertakings. Several interviews were also conducted during field visits with technical personnel in the departments of energy and water in Zambia, and energy, water and irrigation, and transport in Malawi. These interviews were conducted to further understanding of the goals behind the ongoing and proposed water engineering projects and how these shape developments in the basin both at national and regional levels. Water, land and air transportation was used in order to survey the landscape and appreciate the river characteristics in the basin as well as how societies interact with water from different perspectives i.e. through various land uses.

While the field trips were fruitful in terms of data that was collected, there were however some difficulties in getting most of the data through interviews particularly due to the political developments that were prevailing at this particular time. In Malawi, the disagreements between the government of Malawi and Mozambique over the Shire-Zambezi Waterway rendered the discussions surrounding this project very difficult as technocrats were barred from commenting on the project. This was due to the heavy politicization of the project by the highest office in the land and the political setback suffered from the failure to open the Shire River port as promised. This was also extended to the proposed Malawi-Mozambique power interconnection project which too was at the verge of collapsing. In Zambia, the field visit was carried out close to a fiercely contested General Election where the issue of Chinese involvement in the Zambian economy was at the centre stage. This created some problems when trying to get the insights from the technocrats on some of the key projects that were financially backed by the Chinese Government.

Finally, while the focus of the thesis is geographically limited to the Zambezi River Basin, this study also chose to focus on regional instruments under SADC as well as progress and developments in other Southern Africa River Basins. The reason is that water management instruments at the SADC level have influenced the conclusion of treaties at basin level in Southern Africa. In addition, the Zambezi River Action Plan (ZACPLAN), the first basin-wide management plan, was implemented by the SADC (and before its establishment, the Southern Africa Development Coordinating Conference (SADCC). This influence has also been the other way round where for instance the need to establish a river basin organization to implement the ZACPLAN necessitated the development of the SADC water protocol. The Zambezi Watercourse Commission (ZAMCOM) agreement also lacks conflict resolution mechanisms; instead disputes are supposed to be handled by the SADC tribunal. Attempts to better understand the dynamics in the Zambezi River Basin therefore also require an exploration of what happens at the SADC level and in other Southern Africa river basins.

In the context of this thesis, river basins in Southern Africa refer to only those river basins exclusively located in Southern Africa. With four of the nine riparian countries in the Congo River Basin being Southern African countries, certainly the Congo has an important role to play in Southern Africa[5]. However, the Congo will not be referred to as a Southern African river basin in this context. For Southern Africa, its international river basins include the Kunene, Culevai, Okavango, Orange, Maputo, Umbeluzi, Incomati, Limpopo, Save, Buzi, Pungué, Rovuma and the Zambezi of which the Zambezi, Orange, Okavango and Limpopo Basins are the largest in the region (Heyns 2003). It is also crucial to refer to other river basins in Southern Africa from time to

[5] Detailed discussion on this can be found in Chapter 5

time since the driest countries in the Zambezi River Basin, Botswana and Namibia are riparian to all the major river basins in the region i.e. Zambezi, Orange, Limpopo and Okavango (Mohamed 2003).

1.6 Thesis outline

Chapters in this thesis are organised in a way that highlights continuities and discontinuities over time as well as the dynamic nature of international water management in the basin. The first chapter outlines the scope of study and substantiates the theoretical and methodological approach.

Chapter two discusses in detail theoretical approaches to studying water management in international river basins. The chapter introduces the conceptual framework of water-society systems as an over-arching conceptual apparatus in the study of water management historically and in the long-term. It discusses this concept as a means to analyse the evolutions in international water management in the Zambezi River Basin. The strength of this concept is considered to be the way it allows the discussion of social facts without losing sight of the significance of the natural environment under which such social transformations take place and the dialectics between the two over time. Furthermore, the chapter explores discourses on conflict and cooperation in international water management and centres on the concept of strategic interaction and hydro-hegemony as key theoretical approaches in this thesis. Additionally, chapter two discusses legal instruments that aim to enhance international cooperation as well as resolve water-related conflicts amicably.

Chapter three explores the underlying factors to the development of weak international water cooperation in the basin in the wake of political transformations from the second half of the twentieth century. The chapter focuses on changing geopolitical relations, changing colonial policies, the rise of African nationalism and the role of the Republic of South Africa as a hegemonic state in the region in terms of the creation of water management regimes in the basin. This discussion is undertaken with relations to both the geographical configuration of the basin and its hydrologic characteristics. In addition, the chapter explores how internal, regional and global politics i.e. socialist and capitalist ideologies including global economic changes propelled countries towards nationalistic policies for the development of water resources. The theory of hydro-hegemony is applied to the analysis of water management in this period.

Chapter four explores the attempts of the basin states from the 1980s to develop instruments to manage the waters of the Zambezi River Basin in a coordinated fashion. The chapter draws from both basin-level and global-level processes to provide a basis for understanding the initiation in this period of international water management. In other words, the chapter explores the driving forces behind the conclusion of the bilateral, basin-wide as well regional water management instruments and how they influenced activities in the Zambezi River Basin, particularly in relation to hydropower development.

Chapter five explores new forces that may influence the nature of water resources management in the basin. Climate change, escalating demands for energy due to growing economies as well as the growing influence of China are all analysed in relation to their possible influence on the nature and extent of water resources development in the basin. This chapter acknowledges that the development of water resources in the basin has historically been partly influenced by actors at great distances from the confines of the basin. The evolving nature of global water management philosophy and international watercourse law has also influenced international water cooperation in the basin. The chapter also explores the emergence of China as a major economic force in Africa and its potential to test the resilience of the established water management instruments in the basin.

Chapter six, which concludes the thesis, summarises the development and nature of water resources management in the basin and how the present characteristics of hydro-politics have evolved. Based on the developments described and interpreted in the thesis, the chapter also highlights some of the key issues that are thought to be of importance in the future, as both social and hydrologic factors change. It is hoped that this thesis, as a comprehensive study of this major river basin, will make a significant contribution to the understanding of hydro-political dynamics in the Zambezi Basin emanating from hydro-electric power initiatives and how these affect the wider social, economic, political, hydrologic and environmental realms in the basin and the region.

Chapter two

Water systems and conflict and cooperation in international water management

This chapter aims to explore in detail three conceptual frameworks used in this thesis namely; water-society systems; strategic interaction; and hydro-hegemony. The first two conceptual frameworks cover the primacy of geography and hydrology in international water resources management as opposed to the theory of hydro-hegemony which relegates the role of geography to a lesser position in the analysis. This chapter also explores other concepts particularly relating to conflict and cooperation in order to highlight how international water management is largely approached across the world.

It is important also to note that while some scholars advocate a systematic study of river basins and treaties, nonetheless, the complexity present in international river basins may limit the universal application of measures and procedures as evidenced by the generalization characteristic of the 1997 United Nation Convention on the Law of Non-navigational Uses of International Watercourses. As Varis et al. note, special characteristics of each river basin may necessitate unique plans of action (see Varis et al. 2008). Thus we need to approach the study of water with the knowledge that while water is indeed universalistic, it is also particularistic in that there are variations in water availability and form, and in how different societies control and use water. This implies that established water management regimes are better understood geographically and historically; hence the historical-geographical approach of this study.

2.1 Social-Ecological Systems in summary

The departing point for social ecological systems theorists is that "all humanly used resources are embedded in complex, social-ecological systems" (Ostrom 2009: 419). The logic behind SESs is that human and natural systems should not be treated independently (Folke et al. 2002; Folke 2003: see also Redman, Grove & Kuby 2004). Humans depend on the ecosystem for their viability and in turn their actions influence the performance of the ecosystem (Folke et al. 2002). In other words, each of these systems has continuously influenced the other (Folke 2003). At the core of an SES is the constant interaction of the biophysical and social factors in what would be considered a resilient and sustained manner (Tvedt 2015). Social-ecological system as a systems theory is therefore interested in how the system behaves under varied conditions. Thus the focus is on "stability, persistence, resilience, and possible transformations" to the system (Leslie & McCabe 2013: 116). Key to the definitions of SES is also the setting of "spatial and/or functional boundaries for an SES" (Leslie & McCabe 2013: 116). Generally, social ecological systems are defined in terms of their components and how those components interrelate with one another – i.e. "species, geophysical characteristics of the landscape, social actors, institutions" etc (Leslie & McCabe 2013: 115-116).

SES importantly looks at the relationships between the social and the natural phenomena and has significantly focussed on resilience of the system. If we consider that all humanly used resources are indeed embedded in complex, social-ecological systems, then social resilience to the system can be defined as how best groups or communities can live with socially and environmentally induced disturbances (Adger 2000), or in other words "the capacity to buffer change, learn and develop" (Folke et al. 2002: 438). In the context of water and society, this definition may be considered in terms of the ability of societies to cope with droughts and floods particularly if they are of long term as well as changes in hydrologic regimes. To what extent does the society live with changes in water manifestation without being severely compromised in its processes? The interest is then on how people respond to those challenging situations particularly through cases studies (see Leslie & McCabe 2013). In ecological context, resilience of the system may be defined as "as a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling 1973: 14). Thus rather than also perceiving the biosphere as resilient to all anthropogenic activities, SESs should focus on enhancing the capacity of the system to deal with change (Folke 2003).

In promoting integrated research i.e. integrating social science into ecological research, Redman et al. (2004) suggest that the focus of the research should be on linkages and thus interactions of the social and ecological components of the system under study. Once linkages of importance to the study are identified, the focus is on "patterns and processes" (Redman et al. 2004: 164).

One of the obvious problems with SES is how to deal with system boundaries in the truest sense, importantly one of the main criticisms of SESs (see Leslie & McCabe 2013). The challenge is how to deal with the interactions of the social and ecological components of the system that are taking place at different spatial scales (see Redman et al. 2004), in what is otherwise considered as a total and closed system (Tvedt 2015). If there is an agreement that climate change impacts are felt far away from where those are generated (see Hamududu & Killingtveit 2012; Kumar et al. 2011), then changes in a particular system, i.e. river basin in this study, are not necessarily a reflection of the anthropogenic changes in this particular basin. While it is generally acceptable that the recent observable climate change can be largely attributed to anthropogenic causes, the impacts of climate change are regionally manifested with other areas negatively impacted than others. Rainfall for instance is expected to increase in other regions particularly the mid latitudes and expected to decrease in the sub-tropics (Kumar et al. 2011; Hamududu & Killingtveit 2012). Africa is expected to be impacted significantly despite its limited contribution to greenhouse gases. Thus the change in the water resource system in a particular basin, the Zambezi River Basin in this case, may be a result of the global systemic changes that have little to do with water use patterns and environmental changes in the Zambezi River Basin.

Alternatively, changes in institutional arrangements and mandates in the Zambezi River Basin may be a result of changes that are taking place elsewhere. For instance the 1997 United Nations Convention on the Law of Non-Navigational Uses of International Watercourses and its agreed instruments influence how water institutions are negotiated.[6] In this way, the influence is originating from outside what would be considered the system boundary i.e. river basin.

Another problem with most of the frameworks in SES is that they tend to model human behaviour in terms of general trends rather than variations in response to stimuli (see Leslie and McCabe 2013). In terms of water resource management, the obvious question would be on how different groups of people respond to an emerging water scarcity or environmental degradation. Does this change in the ecological conditions promote the spirit of cooperation or conflict? Is it possible for a state, as an actor of interest, to act differently to same stimuli based on the value it places on each resource, its position in the basin as well as the nature of international relations it has with other basin states? Can a state's response to the changes in ecological conditions be predicted with great certainty? What if the state's preferred response to an ecological change is not in tandem with its local groups? What would then be the likely response to an ecological change? All these questions pose challenges to modelling social response to an ecological change where response diversity is expected (see also Leslie & McCabe 2013).

With specific reference to studying resilience of a given system, Leslie & McCabe (2004) argue that it is difficult to measure resilience in complex systems and may

[6] Detailed discussion in Chapter 4

require lengthy periods of observations and still render problems in attempts to generalize causal relationships. Instead, SES theorists resort to or advocate the studying of attributes that contribute to resilience rather than measuring resilience itself (Leslie & McCabe 2004). Therefore, critically assessing the challenges that SES would impose in studying international water management in the Zambezi River Basin, particularly when considering challenges of dealing with response diversity, and matching components that are occurring at multiple scales, a water-society system concept was rather adopted which is generally a methodological concept i.e. it lays out steps that need to be followed in order to achieve a scientific understanding of water-society systems.

2.2 The Concept of water-society systems

In order to study a society's use and control of water comprehensively one has also to not only understand the nature of the water resource itself, but also how the relationship between the resource and humans develop over time and how the resource itself is impacted by this relationship and development. It is also necessary to reconstruct and understand how the history of ideas about resources and water are impacted both by the varying physical characteristics of water and the history of the local and regional relationships between society and water. A conceptual framework used in this thesis is therefore the Water-Society Systems approach, suggested by Tvedt (2010) and refined in Tvedt (2015), that argues for and shows a way how to integrate relationship with nature or waterscapes into social analyses of water and society. This thesis take that position by recognizing that the Zambezi River Basin is not completely natural or social but contain inherent linkages of both the natural and social elements.

The Water-Society System approach is largely an open concept and is well applicable even in situations where water is not sustainable or has no regular interaction with the society and where the system is not resilient (Tvedt 2015). Studying the dynamic relationships between water and society therefore does not need to establish equilibrium points or changes in these equilibriums, or resilience and adaptation, as what would normally be the case with SESs (see Tvedt 2015). Tvedt argues that water is not necessarily a closed system and while water works invariably change the attributes of a particular system, new systems are also created in this way i.e damming where the presence of the large reservoir may affect local weather or climate. Rather than approaching the study of water in society from the preconceived ideas of resilience, adaptation and optimality, the water-society system allows openness to the study that may be suitable for water that is critical or not, a system that is resilient or not and where there is no adaptation or even where a system fails (Tvedt 2015). This approach also allows the study of the system where rare natural occurrences impact the system and the dynamics of the water society system i.e. natural disasters of significant magnitude. What is also critical in this conceptual apparatus is its consideration of the need to not lose sight of natural or structural properties of water such as hydrologic while maintaining the autonomy of the social aspects of water (Tvedt 2015).

The water-society system conceptual framework acknowledges the fact that water is both universalistic and particularistic at the same time. Water is universalistic in the sense that all societies and individuals at all times have relied on water for various needs, but at the same time water is particularistic in the sense that the way water moves across the landscape varies both in space and time. Thus the way society adapts to water or attempts to control it as it moves across the land expectedly differs both in time and space. These characteristics form a strong theoretical and empirical basis for comparing water-society relations across different societies but also between different periods within the same society, and for exploring what is particular in any river basin, as the Zambezi basin for example.

By integrating into the conceptual approach that water has very special characteristics in relation to society; it is always in a flux, it evaporates both from land and water and falls back as rain and snow in some other location, it underlines the limits of human efforts in controlling nature since water can only be temporarily or partially controlled. The limited capability of humans to control water underpins the complexity of establishing property rights and binding legal rules when water is concerned. It is also apparent that while the hydrologic cycle is largely a natural process, humans have altered their environment which has also influenced how water moves across the landscape. The actual hydrologic cycle, thus the movement of water, is therefore the product of both the hydrologic cycle and the hydro-social cycle, as the actual hydro-social cycle is the product of both the hydrological and hydro-social cycle (Tvedt 2015). In other words, even though the hydrologic cycle is a natural process, the water cycle is increasingly influenced by what happens to water as it moves through societies and how societies control and use it. Analytical approaches to studying water in society might therefore benefit from an understanding that water is both a product of nature and the social existing in nature and a product of both nature and social in society (Tvedt 2015). A useful analysis of water/society issues will therefore be able to explain simultaneously how societies have been impacted by their physical waterscape, and how in the process of adapting to or controlling their physical waterscape they have changed both the physical waterscape and their environment, including themselves. Importantly, this type of analysis must also question and attempt to answer how societies or different actors have given different meanings to water that influences also how water is appropriated.

The water-society system conceptual apparatus proposes three analytical layers in exploring water/society issues. The first layer of analysis is water's natural (physical and chemical) form and behaviour (Tvedt 2015). The primary focus in this layer of analysis is the hydrologic cycle and other natural characteristics including topology, geology and broader climatic patterns which overtime have generally influenced patterns of societal emergence and development. The assertion in this analytical layer is that hydrological characteristics such as precipitation and evaporation rates have a substantial bearing on water availability in the landscape. Furthermore, the way water runs in the landscape and its manifestation such as in rivers, lakes, aquifers and wetlands, for instance, has an impact on patterns of settlements and how societies relate to water. Such being the case, the characteristic of the hydrological cycle and basin geography facilitate other water uses while at the same time present challenges to others. Irrigation farming for example may dominate in the valleys and near the mouths of rivers as opposed to the headwaters. Even in consideration of the international watercourse law, a comprehension of the earth's water system's general characteristics, as McCaffrey argues, is necessary to understand what effects the legal rules have on fresh water governance (McCaffrey 2007).

Historically, societies have attempted to adapt to temporal variations in water availability and in various ways control water resources for various uses in a bid to advance (see Obeng 1977). Water engineering works deployed to control and manage temporal variations in water availability for instance played an important role in the growth of early civilizations including Egypt, ancient Babylon, and India among others (Obeng 1977). For such reasons, not all waterscapes remain in their natural form. What this means is that where water availability exhibits significant variations, as is the case in the Zambezi River Basin, river regulatory works may be required to modify the flow in order to facilitate certain water uses in both time and space. The result is a system that is neither completely social nor natural. Swyngedouw (1996) explores the concept of a city as a hybrid using the metaphor of a cyborg, a cross between machine and human that is neither completely animal nor completely machine and argues that in the same way even the water system in the city mirrors this cyborg. With all channelization, water piping and use of water system for effluent disposal, does the city's water system become completely social? This brings us to the second layer of analysis in water-society systems, which focuses on the anthropogenic or human-induced changes in the movement and manifestation of water across the landscape.

Human activities that aim to control and use water range widely and include infrastructure for municipal and industrial use, irrigation agriculture, hydropower developments and others. Such works as already mentioned may be necessary to facilitate uses that would otherwise be impractical without modifications to the flow regime. Nevertheless, these activities impact on the hydrologic cycle in a number of ways such as affecting evaporation and precipitation patterns. The construction of dams for hydropower development in the Zambezi Basin for instance accounts for 10 per cent of overall evaporation rates of the available water in the basin (Chenje 2000). The reservoirs formed as a result of these dams increase the water surface area, and when coupled with high temperatures, result in an increase in overall evaporation rates (see Waterbury 1979). This shows that human influence is clearly reflected in some of the natural processes in the hydrologic cycle, as evidenced in the Zambezi River Basin. Thus, while dams aim to regulate flow to facilitate hydro-electric power production, they also produce observable changes in the hydrologic cycle which may influence broader climatic patterns in the region. The Zambezi River system therefore, just as many river systems, reflects man-made alterations that have changed the water systems, river flows in particular (both high and low), the timing of flow, turbidity levels etc.

Anthropogenic changes to the water system create new hydrological and hydro-political realities. Such changes influence how water rights are negotiated and water treaties concluded. This is apparent within international water management. The concept of harm in international river basins for instance is conventionally considered in an upstream to downstream direction in successive rivers because of the way water moves. While this is true in the physical sense, as McCaffrey argues, if a downstream state is able to successfully impose limitations on water developments upstream through the principle of absolute territorial integrity, then in effect the downstream state is harming the upstream state (McCaffrey 2007). A classic example of this is found in Egypt and the Nile Basin, where the government of Egypt cites prior use and colonial agreements as justification for its water rights which constrain the development of water resources in the upstream countries (see Dombrowsky 2007).

Advancements in technology and water engineering may facilitate multiple ways of exploiting water as history reveals. Nevertheless, the capacity to exploit water resources in multiple ways does not imply that all these ways are pursued. In addition, since any use of water, or the appropriation of water, generates externalities on other water uses, conflicts between different water uses and between water users may emerge particularly where one use or user significantly hampers other uses or users (see Dombrowsky 2007). Questions therefore regarding whether or not and how to appropriate water and for what purposes, are always central in the practice of water management. How these pertinent questions are dealt with by the society forms the core of the third analytical layer in the concept of water-society systems. This layer focuses on how water is ascribed different meanings by different groups of people and also how water symbolises different things to different people in both time and space. "Water as an element of nature and society – as a natural resource and a social good - will always be culturally constructed and filtered" (Tvedt & Coopey 2010: 7). This thesis will as such clearly demonstrate how dams constructed for water control to facilitate hydro-electric power production have been ascribed different meanings by different actors and groups of people and how such differences have consequently influenced international water management in the Zambezi River Basin. Examples will be provided on how water control using dams has symbolised different things to different groups such as economic progress to the economists, human ingenuity over nature to the water engineers, political and cultural control to the colonial administrators, and political oppression and exclusion to the Africans in the colonial time.

Importantly, ideas of water are not formed in a vacuum but are related to a broad range of issues. The ideas of water may be formed in relation to power dynamics and relations; management practices; peculiarities of society and culture; and inherent components of religious and cultural practices (Tvedt 2015). For instance, the Kariba Gorge and its powerful torrents symbolised the power of the mythical god 'Nyami' for the local communities while untapped hydro-electric power potential for the administrators (Hughes 2006). The construction of the dam did not therefore only change the physical aspect of the gorge and the flow of water but was also spiritually symbolic as it represented a contest for supremacy between European science and the African river deity (Clements 1960).

Since formation of the ideas of water is related to a broad range of issues, it is expected that these ideas of water change over time as relevant issues change. For instance, water management has been within the realm of water engineers for a good part of the twentieth century. Increasing environmental considerations and the role of the public in water management have gradually transformed ideas of how to manage water and which stakeholders to involve. Dams, particularly large dams, which were a symbol of human progress for a good part of the last century (WCD 2000), have become heavily contested as different groups assert their influence on how to control and use water in general. On the other hand, while some quarters recommend that water should be treated as an economic good to improve water use efficiency, others see it as a human right because of its irreplaceability and essentiality to human life. This change in ideas of water is also evident in international water treaties, where earlier treaties were dominated by navigational issues and, by their design, prioritized navigational uses. Modern treaties do not generally prioritise navigation over other uses, even in areas where navigation is still important (McCaffrey 2007). This has resulted from the increasing importance and recognition of non-navigational uses of water.

The conceptual framework of water-society systems might be useful in the sense that while a lot of focus in this thesis will be on social interactions and facts, the concept will underline and give attention to the fact that the relationship between the physical and the social is also very important to integrate in the analysis. Thus, it might help to overcome reductionism in one way or another. As Tvedt (2015) argues, water and society are deeply interwoven and no waterscape is completely natural or completely controlled. After all, this study on international water management centres on hydropower developments and thus both social and natural factors are fundamental to their analyses. Hydropower development is not just a question of economic capacity and technological prowess of a society. Hydropower sites have to be geologically suitable and the water system has to favour such developments. Hence, to understand such developments or the lack of the same, one requires both social and natural facts.

The three layers of the water-society system conceptual framework, while separate, are also intrinsically linked. For instance, the second analytical layer can be viewed as a close interaction between the first and third analytical layers. In other words, a particular physical environment may necessitate certain water control measures but the question of how to institute them and to what extent will depend on the ideas of water and the meanings ascribed to water in a given society. Naturally, the institution of particular water control mechanisms will also depend on the technological traditions and management ideas of the society (Tvedt 2015). The new hydrological and hydro-political realities that result from anthropogenic changes to the water system also influence the ideas of water in a given society in this continuous cycle of ideas of water and use and control of water.

In reality, it is not just changes in the physical waterscape that necessitate institutional and conceptual changes or the ideas of water. Even where the physical environment remains largely unchanged or changes insignificantly, the way the physical environment is perceived might change as people's ideas of water and their values and belief systems change. This should be expected since society's conception of the "physical reality" is shaped by "values, interests, conflict and power" which in turn influence its formation (Tvedt & Coopey 2010: 5). One obvious example is the increasing acceptance of accounting for environmental flows in establishing water management regimes. Ideally, this means that before water can be allocated to other uses, a minimum flow must be established for the system to cater for environmental flows in order to preserve the ecosystem. Literature shows that accounting for environmental flows currently ranges from 0, or not accounted for, to around 10 per cent in water management plans, depending on the country (Dinar et al. 2007). Accounting for environmental flows nonetheless reduces the amount of water available for other uses and thereby has implications for the prevailing water management regimes. A Multi-sector Investment Opportunities Analysis study by the World Bank has for instance revealed that accounting for environmental flows to restore natural flood in the lower Zambezi may incur certain penalties on the total amount of energy produced (World Bank 2010a). Thus, the incorporation of environmental flows in water management practice does not only have theoretical implications but also practical implications for water management i.e. sustainability of hydropower plants where dams have been single purpose in design and operation.

Technological capabilities and economic capacities of states/societies or nations also shape the very ideas of water in any given society. The increasing adoption of water recycling and desalination for instance may alter a state's perception and approach to freshwater, and shared freshwater resources in particular (see Wolf et al. 2003). In addition, the state's capability to trade as with regards to a state's economy in the form of high value services i.e. financial services, may influence its perception of international rivers and hence its participation in the management of such resources. Allan & Mirumachi for instance argue that international trade may be used to allay potential conflicts in international river basins (Allan & Mirumachi 2010). They further argue that a diversified economy is what guarantees the water security of a riparian state as compared to relative power and riparian position (Allan & Mirumachi 2010). The basic argument of these authors is that sometimes the solutions to a water crisis for a particular state may be found outside the basin and even outside the water sector itself (Allan & Mirumachi 2010). On the other hand, the limited capacity of riparian states to diversify their economies also restricts their policy options with regards to usage of international watercourses which may elevate conflicts (Daoudy 2010). This should make sense considering that irrigation agriculture represents the largest single form of water use in many river basins, and thus the import of food commodities may drastically cut the water budget of any given riparian state. Nevertheless, that argument becomes misplaced in river basins where the economies of the riparian states are largely based on agriculture, such as the Zambezi River Basin.

Analyses of international water management in the Zambezi River basin in a historical-geographical perspective must therefore explore a wide set of issues and reflect on their interactions over time. The need for both natural science data (primarily captured in the first analytical layer) and social science data hardly needs more emphasis. Analyses of the evolution of international water management in the Zambezi River Basin thus involve interpretation of the physical-social interactions as the study itself is an environmentally related social analysis.

2.3 Riparian states and water rights

Riparian states to an international river basin are interconnected to each other through the flow of water, as water flows irrespective of political borders and thereby creating a problem of spatial fit (Dombrowsky 2007; Daoudy 2010). This creates a set of complex interdependencies among the riparian states as one state's use of water may affect another state. Complex interdependencies and externalities, whether positive or negative, unidirectional or reciprocal, associated with shared waters may potentially lead to conflicts but at the same time may also provide a sound basis for mutual cooperation (Kumar et al. 2011; Elhance op cit. Dinar 2008: 9). As water becomes scarce due to burgeoning populations, growing economies and climate change, the nature of international water relations in an international basin becomes of critical importance since increased scarcity of water may lead to increased competition between uses as well as users.

Varying geographical positions in a river basin create different opportunities and challenges for the riparian states, with implications for the existing water management regimes. Different doctrines have been advanced particularly when it comes to justifying an individual state's rights to water in an international basin (see Dombrowsky 2007). Within the International Water Allocation Theory, four doctrines have been advanced in an attempt to sort out property rights in shared basins (Giordano & Wolf 2003). One of the doctrines is that of 'absolute territorial sovereignty' which specifies that a state, due to its sovereign rights, can exploit water resources within its borders without due consideration for the other riparian states (McIntyre 2010: Maluwa 1992). Typically known as the Harmon doctrine, this theory has been attributed to Harmon, an attorney in the United States of America, who on 12 December 1895 gave an opinion that the United States of America had the right to use water in Rio Grande River and could not be held accountable for the hydrologic changes in Mexico, a downstream state in the basin (McCaffrey 2007). This is an argument that has been favoured by upstream states who perceive that their right to water within their borders is being restricted by the demands of the downstream states (see Giordano & Wolf 2003). Nevertheless, it is a principle that has not been used to resolve conflicts in international watercourses despite the fact that it has been expressed in diplomatic exchanges by a few states around the globe (McCaffrey 2007; Maluwa 1992; Akweenda 2002). Maluwa nonetheless suggests that Harmon was merely expressing a legal opinion that in the absence of legal provisions, the USA had a right to do whatever it desired with the watercourses in its territory (Maluwa 1992).

Completely opposite to the doctrine of 'absolute territorial sovereignty' is the doctrine of 'absolute territorial integrity' which argues that a downstream state has the right not to be harmed by an upstream state (McIntyre 2010). For historical reasons, where water has been significantly used by downstream states particularly in irrigated agriculture, the notion of prior use is often used to support the doctrine of 'absolute territorial integrity'. This often puts restrictions on the upstream states, where the most suitable dam sites for hydro-electric power are located (see Dombrowsky 2007). Nonetheless, hydro-electric power development is a recent phenomenon compared to irrigation agriculture which has existed for thousands of years (see Giordano & Wolf 2003; Dinar et al. 2007). Thus the argument of prior use will in most cases favour downstream states where there is the highest level of irrigation potential and exploitation due to the availability of flatlands. Giordano & Wolf argue that prior uses, as indicated in treaty analyses, are protected in treaties and particularly those covering arid or exotic streams (Giordano & Wolf 2003). McCaffrey however argues that there is no law that absolutely protects prior uses because such a proposition would prohibit any water development upstream (McCaffrey 2007; see also Maluwa 1992). Relying on the two extreme doctrines of water allocation may as such lead to conflict, thereby necessitating a strong need for the resolution of property rights through treaties and other forms of international agreements.

The third doctrine in international water allocation is 'limited territorial sovereignty' which stipulates that a state has the right to water in an international basin but in a way that does not obstruct other states' rights to water in that basin (Dombrowsky 2007; Giordano & Wolf 2003). This doctrine entails both rights and obligations on the riparian states. This is the position that arguably has become the conceptual underpinning of the 1997 United Nations Convention on the Law of Non-Navigational Uses of International Watercourses whose main provisions include reasonable and equitable utilisation and the obligation not to cause significant harm (Giordano & Wolf 2003; McIntyre 2010). This requires the cooperation of all the riparian states in order to establish what is equitable, since equitable does not necessarily imply equal water shares and as such may become problematic in coming up with precise formulations (see Maluwa 1992). Furthermore, the establishment of what is equitable necessitates a continuous process of cooperation, as what is equitable cannot be static when there are continuous changes in the physical as well as social, economic and political conditions.

Lastly we have the doctrine of ‘community of interests’ which specifies that “the natural physical unity of watercourse creates a community of interest or interests in the resource” (Dombrowsky 2007: 64; McIntyre 2010). This is what lies at the core of integrated watershed management (Maluwa 2002). Giordano & Wolf refer to this doctrine as “the principle of allocating water on the basis of economic value”. For this particular reason, markets are at the centre of allocating water based on water use efficiency (Giordano & Wolf 2003: 74). However, it should be pointed out that while benefit sharing may be attractive and lead to optimal use of water, it may have some practical limitations, for instance, in the Zambezi River Basin states where the agricultural sector is the largest employer (see Daoudy 2010).

Within the doctrine of community of interests, the watercourse is perceived as a common property of the riparian states. Dombrowsky points out that while the term ‘shared water resources’ has been lacking from many water agreements in the twentieth century, the 1995 Southern Africa Development Community (SADC) Protocol on shared watercourse systems used the term ‘shared’ to denote the “common character of international watercourses” (Dombrowsky 2007: 64). However, unlike the position of limited territorial sovereignty which has become the foundation of the 1997 UN Convention, the treatment of the river itself as a common property is not provided for by customary law. Common property requires joint ownership, which by its nature becomes problematic in international water management due to sovereignty issues (see Dombrowsky 2007). Its establishment therefore relies on the willingness of the riparian states to make such arrangements as in the case of the European Union (see McIntyre 2010). Moreover and within this doctrine, economic analysis may have a strong basis for managing international waters since the value of water cannot be abstract in economic terms but denotes the willingness of the individual to pay for water (Dombrowsky 2007). According to Dombrowsky, international watercourse law may inform an economic analysis with regards to the inherent problem in international water management, while on the other hand economic analysis may inform international watercourse law about incentives to bring about mutual cooperation (Dombrowsky 2007).

Based on the four doctrines in the international water allocation theory, a riparian state's preferred doctrine (which in many ways is related to its geographical position in the basin) has implications for the management of international waters. Particularly where a state advances the extreme doctrines of either 'absolute territorial sovereignty' or 'absolute territorial integrity' conflicts over international water are likely.

2.4 Conflict and cooperation in international river basins

Based on the problematic doctrines within international water allocation theory and sovereignty issues by the states, scholars have expectedly advanced different positions on the potential outcomes of international hydro-political relations. Interesting arguments have transpired based on the way scholars have construed the implications of the relationship between basin geography and riparian position as well as the interpretation of property rights. The water wars thesis for instance has been advanced to suggest that disputes over the capture of water resources are likely to increase due to water scarcity, and this heightens the likelihood of inter-state wars (Cooley 1984). Generally, sensationalist positions on water wars seems to resonate with the media but have been given weight in the past when both the Egyptian President, Boutros Boutros-Ghali, and the Vice President of the World Bank in 1995, Ismail Serageldin, stated that the "the wars of the next century would be fought over water" (Tvedt 2011: 237; Wolf et al. 2006). It could also be argued that the water wars thesis seems to be advanced within the broader realist and neo-realist positions within international relations. By using a new data set on shared water resources, the work by Gleditsch, Owen, Furlong & Lacina (2004) seems to support the neo-malthusian explanation of the water wars. Water scarcity or environmental degradation becomes a catalyst for inter-state wars. Furthermore, the water wars thesis basically dwells on the fact that in an anarchic international environment, cooperation is difficult to establish and conflict likely as states aim to reduce interdependency on other states (Dinar 2008; Väyrynen 2003[7]). Such explanations perceive international cooperation as an anomaly (Dinar 2008), particularly for the fact that international agreements in many circumstances are difficult to enforce and until recently, the world still lacked a universally accepted international watercourse law (see Zeitoun & Warner 2006). The 1997 UN Convention on the Law of Non-Navigational Water Uses in International Watercourses was ratified and entered into force on 17 August 2014. However, its success still depends on the mutual acceptance of the concerned parties (Wolf 1998). Where cooperation produces variable levels in gains, a state might decline to cooperate if it feels that the other state gains more from a cooperative arrangement. States, within neo-realism, are therefore concerned with the relative gains of the other states, which might in turn enhance the capability of the other state to cause harm (Dinar 2008). Nevertheless, the water wars thesis generally lacks empirical evidence to support its assertions (see Toset et al. 2000; Turton 2008)

In contrast to the water wars thesis, other scholars have argued that while conflicts are likely in international river basins, this conflict also affords the opportunity to cooperate (see Wolf 1998). These scholars argue that water cooperation has often been discussed on the backdrop of a conflict i.e. that conflict leads to negotiations to resolve it that translate into cooperation (see Dinar et al. 2007; see also Gleick 1993). In other words, scarcity or resource degradation provides an incentive for the riparian states to engage each other for the purpose of finding solutions which necessitate international water cooperation (Dinar et al. 2007).

[7] Väyrynen's 2003 work on Regionalism: Old and New, discussing how the study of international relations has dwelled on the notion of anarchy

Wolf, in his 1998 work on conflict and cooperation along international watercourses, rejects the water wars thesis from several angles (Wolf 1998). The first is the historic argument where Wolf argues that historically, empirical evidence on militarized conflict over water is less dramatic and that most of these conflicts have been about other issues, such as disputes over borders which coincide with the watershed, other than water itself. He further points out that most of these types of conflicts have taken place at sub-national level. The second argument is that of positive correlation between water and cooperation and by using the transboundary freshwater dispute database, reveals that a significant number of freshwater treaties were concluded. Wolf points out to the FAO database which indicated that a total number of 3600 treaties related to water were concluded between 805 and 1984 (Wolf 1998). While the majority of treaties involve navigational uses, the prominence of non-navigational water uses of watercourses has increased in recent times with over 300 treaties concluded on non-navigational uses of watercourses since 1814 (Wolf 1998). Wolf also rejects the water wars thesis from other arguments which include: strategic argument, where the main argument is that a situation that can likely lead to attack i.e. where hegemon is downstream, is only present in few basins (see also Toset et al. 2000); shared interests argument, where states can negotiate to accommodate interests particularly those that are mutually reinforcing i.e. hydropower in the upstream and irrigation in the downstream; institutional resiliency argument, which argues that institutions once formed i.e. treaties concluded, they become resilient, even where political relations become strained (Wolf 1998).

In a later article entitled '*Water can be a Pathway to Peace*', Wolf et al. reinforces his rejection of the water wars thesis by emphasizing that empirical evidence reveals that cooperative relationships between riparian states actually outnumber conflictive relationships (Wolf et al. 2006; see also Wolf et al. 2003). The underlying argument is that the higher level of interdependency created by international waters draws the riparian states together for the purposes of coordinated management of international waters. In other words, such interdependencies moderate the need for a war over water because of the essentiality of the resource. The authors further argue that water is rarely the single cause of conflict but may in some cases exacerbate existing tensions in fragile relations (Wolf et al. 2006; see also Gleick 1993). Rather than a cause of conflict, water infrastructure may however be a target or instrument of war (Toset et al. 2000). Turton for instance highlighted examples from Southern Africa, where the targeting of water infrastructure in the Cunene River Basin during South Africa's offensive activities in Angola in the 1980s did not in any way denote a water-related conflict but rather a military tactical move aiming at weakening the enemy (see Turton 2008)

Based on the findings of the Transboundary Freshwater Dispute Database developed by the Oregon State University on conflictive and cooperative water relations, interdependency created by international river basins does not lead to war as has been posited by the water wars thesis (Wolf et al. 2006). Water, according to Wolf et al. is a greater pathway to peace than conflict in the world's international river basins since the critical importance of water forces riparian states to diligently pursue a path to a cooperative agreement in order to secure its continued access (Wolf et al. 2006). Interestingly, while the theory of hydro-hegemony also rejects the water wars thesis, it attributes this to power dynamics between riparian states. Hydro-hegemony theory postulates that by employing a set of "power-related tactics and strategies" a state exerts its control over international waters (Zeitoun & Warner 2006: 436). Thus the absence of violent international conflict over water is not due to mutual cooperative behaviour by the riparian states but rather as a result of asymmetric power relations which prevent the weaker states from opposing the hegemonic state in the basin.

As empirical evidence indicates more cooperative water relations between riparian states, the authors argue that it is pointless to propagate the water wars thesis but instead focus on 'water peace-making strategy'. The underlying reason for this argument is that when water is securitised, i.e. when water is perceived as a security issue, water-related issues including negotiations fall into the hands of the security agencies and exclude other important agencies i.e. aid agencies and international financial institutions (Wolf et al. 2006). Notably, securitisation of water, where water is perceived as a security issue, may even take place in the absence of actual water scarcity as long as a mere perception of scarcity exists (Allan & Mirumachi 2010). In an increasingly water-scarce situation, water issues may therefore be securitised and treated as a sovereignty issue (Allan & Mirumachi 2010).

The involvement of institutions deemed impartial such as aid agencies and international financial institutions can be productive as they have vast experience in such negotiations and also benefit from the perception of being impartial (Wolf et al. 2006). Pursuing a 'water peace-making strategy' is therefore important because even in the middle of a conflict, water provides an avenue for peaceful dialogue between the riparian states. Additionally, seeking cooperation over international water not only averts conflicts but opens up opportunities for a broader level cooperation among the riparian states (Wolf et al. 2006).

Nonetheless, not all environmental conditions and social relations are conducive to international water cooperation. Deudney argues that cooperation is enhanced where water scarcity is exacerbated by degradation of the environment such that riparian states have to work together in order to halt the degradation (Dinar 2008). Furthermore, Dokken theorizes that scarcities may normally be the starting points for cooperation (Dinar 2008). Dombrowsky on the other hand highlights factors that may obstruct cooperation and argues that water abundance may obviate the need for cooperation. He highlights the relatively abundant water basins of Alaska and Canada, where there are no existing institutional mechanisms for developing water resources. He further argues that initiating cooperation where conflicts exist is likewise difficult as in the case of Turkey and its neighbours (Dombrowsky 2007). The viewpoint here is that as the states start to experience scarcity, the chances to initiate cooperation are high.

Liberalist and Neo-liberal institutionalist positions in international relations argue that states will cooperate when it is in their interest to do so (Dinar 2008). This means that where states perceive no conceivable gains in establishing a cooperative arrangement, such states may opt for non-cooperative relations other than an arrangement that serves the interests of a hegemonic state (see Daoudy 2010). In forming a cooperative arrangement, states normally have to weigh the benefits of cooperation as compared to non-cooperation (Daoudy 2010). From an economic perspective, actors - in this case riparian states - are assumed to be rational and to act in self-interest to maximise their gains through cost benefit analysis (see Dombrowsky 2007). Unlike relative gains that are at the core of neo-realist thought, states are preoccupied with absolute gains in neo-liberalism and for that particular reason are indifferent to the gains attained by the other states (see Dinar 2008). However, for cooperation to really take shape within the liberalist and neo-liberalist thought, institutional arrangements are required to moderate cheating, enhance compliance, minimise or remove mistrust and increase transparency (see Dinar 2008; Dinar et al. 2007).

From the discussions of conflict and cooperation in international river basins, Cascão and Zeitoun observe that many students of hydro-politics have utilised the conflict-cooperation continuum in analysing hydro-political issues in international river basins. The authors argue that analysing transboundary water issues by making use of the conflict-cooperation continuum is not helpful since conflict and cooperation can simultaneously exist as in the ‘two sides of the same coin’ and not necessarily sit on opposite ends. The argument is that “not all conflict is negative, and some forms of ‘cooperation’ can be based on coercion or temporary submissiveness” (Cascão & Zeitoun 2010: 29). It is therefore important to analyse and understand water issues in terms of interaction rather than in terms of conflict or cooperation (Cascão & Zeitoun 2010)

Many of the analyses of international water management in the Zambezi River Basin have been conducted along this line of the conflict-cooperation continuum. The rationale is that without a cooperative framework agreement in place guiding water resources developments in the basin, conflict is an inescapable outcome. In other words, the unilateral development of international waters by the riparian states is in itself conflicting by nature. While that may be true in most cases, it may not always be the case. As some literature shows, conflict is not always a given outcome in the absence of a cooperative arrangement, particularly where water is abundant or where water use is extremely low. In large river basins, ecological conditions can also vary largely from one part of the basin to another and thus present different strategic choices to the basin states (Tvedt 2011). In this way, irrigation in one country may not be a priority as a sufficient amount of rainfall enables rain-fed agricultural production, while at the same time irrigation may be a primary water resource use in another country within the basin.

Tvedt's work on the Nile also provides various examples of how some conflicts have been beneficial in certain aspects. For instance, the construction of the Roseires dam in the Sudan has moderated siltation at the Aswan Dam in Egypt (Tvedt 2011). This project, while resulting in a reduction in the amount of water reaching Egypt at the Aswan, has simultaneously reduced the rate of siltation at the Aswan dam which might subsequently increase its shelf life. These paradoxical situations may exist in many basins where water utilisation in one part of the basin (out of self-interest) may be of some benefit to another part of the basin, despite not being intentional. The need for water and the way these states will relate to it may vary markedly and hence may in some situations obviate the likelihood of conflict. Nevertheless, rapidly changing environmental conditions and exacerbated water demands for societal advancement, if not matched by institutional developments to manage such changes, may lead to conflicts (see Wolf et al. 2003)

Reflecting solely on conflictive and cooperative relations between the basin states may complicate the understanding of underlying issues in the basin, which may form the real basis for mutual cooperation. Uncertain climate and rainfall patterns and continual dynamic relations between societies and their ecological environments pose challenges to forecast what strategic choices the riparian states may opt for in the future as opposed to today. For this particular reason, Varis, Biswas and Tortajada state that dynamic treaties will be better suited to deal with water issues in international basins since change is evident not only in water use patterns but also in demand, supply, management paradigms and society itself (Varis, Biswas & Tortajada et al. 2008). In other words, today's problems may not be tomorrow's problems and strategies that seem reasonable today may be out of touch tomorrow as technological and economic capacities of the states change (see Wolf et al. 2003).

The application or suitability of generalising theories is thus limited when applied to multiple basins. This should not be unexpected since each basin is unique in terms of geography, resource utilisation, values, perceptions, institutions and other factors (see Varis et al. 2008). The combination of river basin physiography, economic and social attributes uniquely shapes the river basin characteristics that may vary markedly from one basin to the next. Solving them may need drafting of strategies that specifically respond to those particular attributes. Thus Cascão & Zietoun (2010) in their contribution to critical hydro-political theory underpin the need to focus on interactions rather than mere conflictive or cooperative relationships since the underlying causes may change overtime.

2.5 International watercourse law and state practice in international river basins

How have geographically induced asymmetric relations been resolved in international watercourse law? International watercourse law for the most part aims to resolve conflicts in international river basins and induce cooperation among the riparian states. In principle, international watercourse law particularly as provided in the 1997 UN Convention on the Law of Non-Navigational Uses of International Watercourses, aims to reconcile the extreme principles of absolute territorial sovereignty and absolute territorial integrity which fundamentally overlook the rights and duties of other states in international watercourses (see Dinar 2008; Dinar et al. 2007; McCaffrey 2007). In this way, this convention embodies the principle of limited territorial sovereignty (Giordano & Wolf 2003). This also fits with what has been the emerging trend towards coordination in international watercourses (see Maluwa 1992).

In attempt to understand the established legal tools for the management of the Zambezi River Basin as well as the core components of the SADC water protocol, exploration of the 1997 UN Convention on Non-navigational Uses of International Watercourses is necessary. This thesis merely touches on those articles that will guide the analysis of international water management in the Zambezi River Basin. This is important in attempt to answer questions as with regards to the rights of each riparian state to the waters of an international watercourse, the reconciliation of old and new water uses, determination of which water uses are prioritized, and resolution of conflicts when they emerge (see Maluwa 2002).

The foundations for the 1997 UN convention are provided by its two articles: article 5 which conveys the principle of equitable and reasonable utilisation; and article 7 which conveys the principle of the obligation not to cause significant harm (Dombrowsky 2007; see also McCaffrey 2007). Both physical factors and how the state uses water as well as how other riparian states use the resource factor to identify how to arrive at reasonable and equitable allocation of water (Dinar et al. 2007). As Maluwa argues, equitable utilization is a “utilitarian concept” and therefore centres on the extent to which each state depends on the water in an international watercourse (Maluwa 1992: 29). Based on what is provided in the UN Convention, an agreement is reasonable and equitable if it “balances the uses, needs and interests of the riparian states” (Dombrowsky 2007: 85). For this particular reason, reasonable and equitable are not absolutes or fixed arrangements but rather negotiated positions (see Dombrowsky 2007). As such, reasonable and equitable utilisation should be a process rather than a non-recurrent circumstance as states will constantly need to adjust to both anthropogenic and natural changes to the watercourse in question (see McCaffrey 2007). Nonetheless, the list of factors provided by article 6 of the international watercourse law, to guide states to reach an agreement on what is reasonable and equitable, is however broad in character and complicates the task of establishing what is reasonable and equitable (Biswas 2008). This suggests that establishing what is reasonable and equitable involves negotiations by the riparian states. This process must also be flexible in order to reflect the changing interests and water use patterns by states which may inevitably influence what is equitable. The argument by Varis et al. therefore becomes relevant when they advocate dynamic treaties to better respond to the ever-changing water management practices and paradigms, shifting use patterns and other key factors such as technology development. Thus the Convention is just a starting point, and the resolution of property rights and limitation of the likelihood of conflict will depend on the states establishing basin or sub-basin specific treaties that deal with water management specifics generally covered by the international watercourse law.

Effective application of international watercourse law will also depend on the robustness of the “interstate institutional machinery” (McIntyre 2010: 59). Furthermore, “jurisdiction of the international tribunals is consensual” as states involved in a dispute have to conjointly approach such tribunals (Dinar et al. 2007: 56). What this means is that international water management in practice may be hindered by enforcement issues and compliance just as with general international law

(McIntyre 2010).This implies that those international tribunals which may resolve a dispute based on the provisions of international watercourse law are as effective as the concerned states allow them to be.

Riparian states hold the powers in effectively managing international waters due to the way the international watercourse law has been coined in addition to how disputes are generally resolved. In this way, state sovereignty is indeed only moderated and not fully eroded when managing international waters. Some scholars have as such called for the reconceptualisation of international watercourse law to take into full consideration the fluid nature of water since this nature of water challenges state sovereignty. This is also particularly true as the constant flux of water inherently joins states together regardless of whether the riparian states are willing or unwilling to cooperate, (see Cascão & Zeitoun 2010). The constant flux of water means that any attempt by a given state to control it will only be partial or temporary, and therefore have limited powers to express full sovereign rights over flowing water (see McIntyre 2010).

The 1997 UN Convention took 17 years before it was ratified, 14 years beyond the deadline of the year 2000 and despite most of the UN members signing for the treaty (see also Domrowsky 2007). Among other challenges, some states had concerns that the Convention seemed to be biased towards downstream states and that the Convention fails to adequately regard state sovereignty (Dinar 2008). However, McCaffrey points out that apart from occasional cases where upstream states refer to sovereignty in international watercourses, there is a general understanding that the sovereign interest of one state is not necessarily higher than the sovereign interests of other states (see McCaffrey 2007). Thus the establishment of property rights as well as the resolution of conflicts and establishment of cooperative arrangements will depend on further negotiations by the riparian states (see also Dombrowsky 2007). This however should be expected since the spatial coverage of the international watercourse law is vast and as such can only be general in its application. Considering that basin dynamics also vary greatly across basins, the need for basin-specific as well as sub-basin-specific agreements needs no emphasis. The substantive scope of the treaties should therefore reflect important aspects and dynamics in each particular basin. How states resolve issues of property rights in international waters can better be understood by analysing basin-specific or sub-basin treaties. Such treaties, for each basin, will be a result of cooperative efforts among the riparian states in their quest to increase their individual as well as collective gains.

2.6 Cooperative mechanisms

How then do riparian states address geographic asymmetries when the international watercourse law has failed to adequately provide a solution to the problem of spatial fit? While states are encouraged to cooperate in order to use water reasonably and equitably, riparian states may not mechanically pursue a cooperative mechanism in any given international basin. Moreover, even if many states agree on a cooperative arrangement, not all established cooperative arrangements will be successful (see Dinar et al. 2007). Nonetheless, it is generally agreed that there is need for cooperation among basin states in order to increase mutual gains and allay conflicts in the basin. Questions, nevertheless, still arise with regards to if and when it is in the interest of the riparian states to cooperate (Dombrowsky 2007). As previously highlighted, abundant water resources in the basin may sometimes obviate the need for cooperation and setting up of institutions to manage the basin waters. Prevailing conflicts on the other hand may have a similar effect where riparian states fail to cooperate to manage their common waters, hindered by a lack of a conducive environment (Dombrowsky 2007). This is the very reason why only less than 50 per cent of international basins have cooperative agreements (Dombrowsky 2007). Moreover, even in those basins where cooperative agreements exist, they may not be basin-wide and in most cases may not cover all uses of water due to the sheer complexities of water management (see Dombrowsky 2007).

Considering that geography alone creates asymmetric relations, riparian states may not express the same level of willingness to cooperate. Depending on the water use in question, states that are geographically disadvantaged may be more willing to cooperate. Pollution and water quantity issues for instance disadvantage downstream states where upstream states have the opportunity to appropriate as much water as possible and may pollute to the detriment of a downstream state. In this case, the externality is both negative and unidirectional in a downstream direction as a downstream state has limited capacity to reciprocate (Dombrowsky 2007). A downstream state may thus demonstrate an increased willingness to cooperate in order to abate pollution or to secure water for its needs. Navigational uses on the other hand geographically advantage downstream states as navigability of the river increase due to the flatter terrain and the connection to the sea or ocean (see McCaffrey 2007). In this scenario, an upstream state may be more willing to cooperate if it has navigation interests. Thus the geographic configuration of the basin may either inhibit or facilitate cooperation between the riparian states (see Toset et al. 2000; Conca et al. 2003). This also means that water disputes may be more prominent in certain basin configurations than in others i.e. in successive rivers where a state may have more physical control over water than in contiguous rivers where a state has limited physical water control (see McCaffrey 2007; Gleditsch et al. 2004). Since geography creates asymmetric relations between the basin states, other forms of power are necessary for the geographically disadvantaged states to counterbalance the geographic power i.e. economic and military power (Dinar 2008).

Many water researchers, political scientists, the UN as well as the provisions of the international legal principles recommend that states should cooperate in order to attain mutual gains in international water management. Since cooperation is not a given, the way in which states cooperate both on issues and the degree of cooperation will vary from basin to basin but also within basins. Within the hydro-hegemony theory for instance, cooperation is only possible under the direction of the hegemonic state (Zeitoin 2005). The idea is that when the hegemonic state also has the geographic advantage, cooperation is unlikely since there is no incentive for cooperation. However, there are many examples where cooperation exists even where the powerful state also occupy a geographical superior position. For this particular reason, this research utilises the concept of strategic interaction which can be used to explain how states fashion cooperative arrangements in shared basins. As will be later discussed within the hydro-hegemony theory, unlike the hydro-hegemony theory, strategic interaction which comprises side payments, issue-linkage and cost-sharing patterns, geography is as important as other factors i.e. economic, in resolving water conflicts as well as improving international water management (Dinar 2008).

2.7 Strategic interaction in international water relations

The application of the core components of strategic interaction which comprise of side payments, reciprocity and issue-linkage provides a much better analysis of cooperation in international river basins than by placing greater weight on power politics alone (see Dinar 2008). Due to geographic asymmetries, upstream states in successive rivers have naturally less incentives to cooperate (see Dombrowsky 2007), even though cases exist where cooperation is pursued despite a hegemonic state occupying a geographically superior position (see Barrett 1994[8]; Toset et al. 2000). The basic tenet in international water management according to Barrett is that in order for cooperation to be sustained, treaties must be self-enforcing in order to overcome the impeding force of sovereignty in international relations (Barrett 1994; see also McCaffrey 2007). Riparian states are expected to individually make sense of whether it is expedient to cooperate in what is termed as 'individual rationality'. This means that in any given cooperative arrangement, a riparian state loses out by withdrawing from the cooperative arrangement, and no party gains from non-compliance (Dinar 2008:14). Particularly where asymmetric relations exist, side payments may be used to secure cooperation among the riparian states. This is because in order for treaties to be self-enforcing as Oye (1986) points out, all parties have to perceive gains from a potential cooperative arrangement failing which cooperation becomes unlikely (Varis et al. 2008). While

[8] The case of the United States and Mexico in the Rio Grande River

cooperation is important and can really commence between states, there is a need for the states to be committed to the agreements made through contractual agreements or treaties (Dinar 2008). It is the establishment of regimes and institutions that fosters cooperation between states (Dinar 2008). Of course, as pointed out, perceived gains from a cooperative arrangement play an important role for any state when honouring cooperative agreements.

Strategic interaction is important for this particular research because geography is a starting point for analysis. Since basin geography and the hydrologic attributes of a river basin create economic, environmental, political and other types of linkages among the basin states, these important attributes of geography and hydrology should be part of the puzzle to understand conflict and cooperation as well as analyse interactions in international river basins (see Dinar et al. 2007). The underlying reason is that the structural problem of water use in international river basins can be negative unidirectional, positive unidirectional, negative reciprocal or positive reciprocal (Dombrowsky 2007). In unidirectional externalities, the riparian states may have different interests as well as incentives (Dombrowsky 2007). Nevertheless, while geography is important in treaty formation (because of issues of asymmetry), it has less relevance in the levels of cooperation which are influenced by other equally important issues such as governance issues i.e. democratic or autocratic regimes, the overall nature of relations between riparian states, the level of GDP per capita, a state's participation in international trade, etc (Wolf et al. 2003; Gleick 1993; Dinar et al. 2007). While this is the general understanding on conflict and cooperation in shared basins, Wolf et al. (2003) posit that cooperation seems also to be enhanced in years with more rainfall. Thus, geographical factors still play a role in cooperative relations between riparian states.

Dinar's work (2008) on water treaties reveals an interesting outcome in two most important basin geographies. In through-border rivers or successive rivers (a river that crosses the border of one state to another state), side payments are common because of the geographic asymmetry created by such a basin configuration. Because of the unidirectional externalities in a downstream direction predominant in such configurations, where side payments are involved in order to ratchet up cooperation, most of the side payments are from a downstream state to the upstream state. This is true particularly where a downstream state has no reciprocal powers to counterbalance the geographic power of an upstream state (LeMarquand op cit. Dinar 2008). Even in actions undertaken to abate pollution emanating from an upstream state, in some circumstances a downstream state contributes to the abatement of pollution. Since the externality here is both negative and unidirectional in a downstream direction, a downstream state needs to provide an incentive to an upstream state in order for it reduce pollution (see Dinar 2008). This obviously questions the principle of 'polluter pays' which is a generally accepted principle in international water management but shows that in actual practice treaties may be designed differently depending on the basin and the states and issues involved. It is also important to note that while an upstream state can pollute to the detriment of a downstream state, it is the notion that is rejected in practice by both upstream and downstream states (Barrett 1994).

With border-creator or contiguous rivers (rivers that run along the border of two states) on the other hand, Dinar argues that side payments are not necessary to ratchet up cooperation between the riparian states. In this configuration, externalities are partly internalised by the source state and there is the possibility for reciprocity, such that states normally cooperate in order to develop the river or abate pollution (see also Toset et al. 2000). According to LeMarquand, cooperation in contiguous rivers is easily secured because the riparian states attempt to avoid the 'tragedy of the commons' scenario (Dinar 2008).

There are nonetheless some cases where an upstream state pays or meets most of the costs of a project that benefits a downstream state. Even in border-creator rivers where cooperation does not necessitate side payments and costs are normally shared equally, some states pay more than others or costs are shared equally even though the benefits are not shared equally (see Dinar 2008). Dinar attributes this phenomenon to the economic capacity of the states. Dinar argues that countries with high incomes have a higher willingness to pay. Thus in border-creator rivers, they are willing to pay more for a project that may benefit both states equally or even benefits the other riparian state more. Here also, the poorer state uses its weaker economic capacity as a bargaining tool to its advantage (see Dinar 2008). When it comes to pollution issues, Dinar argues that poorer and less developed states have a higher propensity to pollute than richer and more developed states (Dinar et al. 2007). Thus a richer state may be more willing to pay for the abatement of pollution that originates from a poorer upstream country. Similarly here, a poorer and less developed upstream state may use its weaker economic capacity as a bargaining tool to push the cost of cleaning up to a richer downstream state (Dinar et al. 2007).

Contrary to Dinar's arguments, Dombrowsky notes that explicit side payment clauses and issue linkages are not common in treaties and attributes that to the general acceptance of the limited territorial sovereignty of states over international watercourses (Dombrowsky 2007). For Dombrowsky, side payments are problematic because they denote a 'victim pays' principle and weak negotiator, and may encourage strategic behaviour of geographically advantaged states to increase their gains through side payments (Dombrowsky 2007: 197). However, hydropower projects, the main focus in this thesis, carry a higher percentage of side payments and issue linkage compared to pollution control, since hydropower is largely treated as a commodity unlike pollution control which is perceived as an obligation on all states (Dombrowsky 2007).

Issue-linkage may thus be used to solicit cooperation from another state on water issues by linking it to another issue. Issue linkage may also be utilised in integrated water resources management by linking important issues of different water users (Dombrowsky 2007). Based on the works by Haas (1980) and Young (1975), Dinar states that "issue-linkage refers to attempts to gain bargaining leverage on any single issue contingent on the other party's interest in another, perhaps unrelated, issue" (Dinar 2008: 15). In carrying out negotiations particularly in upstream - downstream basin configurations, states may concede on one issue in order to increase their gains on another (Dombrowsky 2007).

Issue-linkage may be employed as a negotiation tactic in international relations where asymmetries exist and side payments are undesirable (Sebenius 1983 op.cit Dombrowsky 2007). Notably though, while issue-linkage may be a mutual exercise, it may also take place as a hegemonic compliance mechanism by the hegemonic state (see Daoudy 2010). One important advantage of issue-linkage is that it may contribute significantly to the resolution of an impasse in water negotiations (Dombrowsky 2007). For this particular reason, an upstream state may cover the costs of the project that benefits a downstream state to secure cooperation on another issue such as immigration, removal of trade barriers, or increased access to navigational facilities (Dinar 2008). Furthermore, states in many situations are riparian to more than one international river basin. While occupying a geographically superior position on one river, a state may occupy a geographically inferior position on another. This may discourage a state from pursuing a strategy on one river that may set bad precedence that may negatively affect it on another river where it holds a geographically inferior position (Barrett 1994). Moreover, if these international river basins involve the same states, cooperation can easily be sought as there are various mechanisms the two states can utilise to increase their gains on all the rivers (Dombrowsky 2007). This is where reciprocity can be better analysed because the harm that one state is able to inflict on the other state on one river can be easily reciprocated by the other state on another river. It is nevertheless an easier task to link issues within the water sector itself as inter-sectoral usage may be problematic particularly in identifying the opportunities that exist (Dombrowsky 2007).

2.8 Are all cooperative arrangements desirable? The theory of hydro-hegemony

It is generally accepted in international politics and hydro-politics that asymmetrical power relations among the riparian states may impact on a cooperative process (see Dinar et al. 2007). In contribution to the critical hydro-political theory, Cascão & Zietoun's work focuses on the role of power and hegemony in transboundary water management, particularly with regards to how they influence exercise of control over shared waters. They have identified four forms and fields of power which either solely or in combination can lead to the rise of a hegemonic state in a river basin. These forms of power include *geographical power* where the state's hegemony results from its advantageous position in the basin i.e. upstream; *material power*, encompassing powers derived from economic, military, technical capability of the state etc; *bargaining power*, largely to do with the state's capability to define the rules of the game such as in negotiations etc; and lastly, *ideational power,* which emerges from the state's ability to shape the narrative relative to the management of the transboundary waters for example (Cascão & Zitoun 2010: 31-32). The fact that some downstream states have more influence in some basins as opposed to the common occurrence of upstream states exerting more influence reflects the fact that hydro-political relations in any basin are complex.

According to the proponents of the hydro-hegemony theory, the source of hegemony for the hegemonic state is normally a combination of various forms of power (Zeitoun 2006). Seen in this line of argument, power dynamics play a critical part in forming cooperative arrangements. The wholesome acceptance of the notion of cooperation as such is increasingly becoming criticised. By focusing merely on cooperation, one runs the risk of overlooking the negative effects of power asymmetries (Zeitoun 2006). This is due to the fact the form of power employed in dominative forms of cooperation is covert and in most cases least observable and yet crucial in maintaining power asymmetries (Zeitoun 2006). The mere existence of a cooperative framework agreement therefore does not necessarily mean that there are mutual gains among the signatories. After all, the whole idea of encouraging cooperation is to create a win-win situation whereby conflicts are resolved and mutual gains are pursued. This has prompted some scholars to question when cooperation should be categorised as cooperation considering that some existing cooperative arrangements are dominative in nature. Selby for instance, while analysing the Israeli-Palestinian Joint Water Committee and the 1995 Oslo Peace Accord between the Israelis and Palestinians, has argued that the agreement is highly skewed in favour of the Israelis and worsens the hydro-situation of the Palestinians (see Selby 2013; see also Zeitoun 2006). The argument therefore is that while an agreement exists between the two parties which is a positive development at face value, it raises serious questions about its nature of cooperation when critically analysed. Cascão & Zeitoun therefore propose that there is a need to distinguish what is labelled as "cooperation" into appropriate categories encompassing "non-cooperation, limited or dominative-type cooperation and comprehensive cooperation" (Cascão & Zeitoun 2010: 27).

The basic premise within hydro-hegemony is that power asymmetry and its role in hydro-political conflicts ought to be given much emphasis, something that has been missing in conventional analysis (Zeitoun 2006; Zeitoun & Warner 2006). Conventionally, there is a tendency to focus on positive sides of cooperation, which has been a way of counterbalancing the 'water wars and green wars literature' (Zeitoun & Warner 2006: 439). The argument is that power asymmetry and different levels of conflict have a role in international relations, particularly considering property rights to water i.e. water allocation and their justifications (Zeitoun & Warner 2006). Coercion, treaties, knowledge construction are all tactics in water resource control strategies including "resource capture, integration and containment" that establish hegemony at the basin level (Zeitoun & Warner 2006: 435). Hydro-hegemony also stipulates that water resource control strategies rely on the employment of power asymmetries which take advantage of the weak international institutional context (Zeitoun & Warner 2006). Thus regime formation in any given international basin is influenced by the hegemonic state in that basin but at the same time recognising that non-hegemonic states normally employ counter-hegemonic mechanisms to attempt to alter the regime in their favour as established by the hegemonic state (see Cascão & Zeitoun 2010; see Earle et al. 2010). Hegemony is defined as “leadership buttressed by authority” as contrasted by dominance which is defined as “leadership buttressed by coercion” (Zeitoun & Warner 2006: 438). Hydro-hegemony then is defined as “hegemony active at basin scale” and is perceived to exist when power relations between two riparian states are highly asymmetrical (Zeitoun 2006: 230). The established hydro-hegemony highly favours the hegemonic (most powerful) state (Zeitoun & Warner 2006). Some of the notable hydro-hegemons – those states with considerable power than their fellow riparian states – include Egypt, Israel, China, India and Turkey (Zeitoun 2006). Perhaps what really separates hydro-hegemony theory from other conventional cooperative theories is that while both reject the water wars thesis, unlike the cooperative theories, hydro-hegemony stipulates that what prevents war in precarious situations is the power imbalance and not the ‘perceived cooperation’ among the riparian states (Zeitoun 2006).

Contrary to the concept of strategic interaction, as advanced by Barrett (2003) and Dinar (2008), geography is not given primacy in forming water management regimes. Instead, power relations among the riparian states are what are considered central to the prevailing international water relations. According to Dinar, basin configuration plays a central role in treaty design while other forms of power such as economic may be utilised to balance the geographic power arising from geographic asymmetries (see Dinar 2008).

Zeitoun argues that the theory of hydro-hegemony is applicable in situations where power relations are asymmetrical, resources are consolidated by the hydro-hegemon and competition is suppressed (Zeitoun 2006). The theory of hydro-hegemony nonetheless has been developed and only tested in the Middle East and North Africa. It is irrefutable that the degree of intensity of conflict perpetuated by cultural variations and power asymmetries, among others, is relatively high in some river basins such as those in the Middle East and North Africa (MENA). However, the level of conflict is aggravated by the modest hydrologic conditions in the MENA region where only around one per cent of global freshwater is renewed despite the region containing five per cent of the global population (Cooley 1984: Gleditsch et al. 2004). This does not mean that the theory cannot be applicable to other basins. Zeitoun already specifies conditions where the theory is applicable and regardless where a particular basin is located, as long those three conditions proposed by Zeitoun are present, the theory can be applied.

The theory of hydro-hegemony can be utilized beyond the context of water scarcity alone. It is true that water scarcity heightens the level of power dynamics. Nevertheless, the control of water resources in terms of river development in river basins with relatively good water availability can stimulate hegemonic behaviours. Moreover, as stipulated in Zeitoun and Warner's article, a water conflict may mean in general terms "some form of disagreement over ideas, principles, or sovereignty in which the opposing forces struggle for victory" (Zeitoun & Warner 2006: 440). Viewed in this particular context, the theory of hydro-hegemony can be suited to any river basin since in many circumstances there are contestations on how to develop the river basin owing to different incentives and interests of the various users.

Since geography assumes a lesser position in hydro-hegemony, the first dimensions of power according to the hydro-hegemony theory lie with the state that has capability to mobilise resources, and these may include military and economic; has modes of production; and can also appropriate knowledge and garner political support (Zeitoun & Warner 2006). The ability to set the rules of the game, in addition to knowledge structure occupy the second and third dimensions of power respectively (Zeitoun & Warner 2006).

Compared to the MENA region and with contrasting water demand and supply, water availability in the Zambezi River Basin is relatively not scarce when the level of water use is considered (see World Bank 2008). Thus within the theory of hydro-hegemony, power asymmetries may be analysed in relation to prioritisation of uses and the modification of the water resource system for particular uses (see Zeitoun & Warner 2006). For instance, hydropower development is a highly contested water use because of its externalities on other uses and users. This theory may be applicable in as far as assessing the politics surrounding the developments of the initial hydropower projects in the Zambezi River Basin i.e. the Kariba project. This may be viewed within the argument that "a state with the ability to plan, construct and operate large infrastructure projects" has the physical ability to change the hydrogeology of the resource, thereby creating new hydro-strategic and hydro-political realities" (Zeitoun 2006: 238).

When it comes to the forms of control over water resources, these can range from **shared**, where cooperation exists; **consolidated**, meaning that the arrangement is highly skewed in favour of the powerful riparian state; and **contested**, where high levels of competition are exhibited (Zeitoun 2006). While a stronger state may prefer to employ a unilateralist approach in capturing the water resource, the stronger state may instead choose to co-opt the weaker states in what is termed '*containment strategies*' as an efficient means of capturing the resource in its favour. Here, the stronger state uses various mechanisms to steer the weaker riparian states to support its preferred position. Coercive, utilitarian, normative and hegemonic mechanisms can be used to produce hegemonic compliance (Zeitoun & Warner 2006). In other circumstances, 'integration strategies' are pursued where incentives are provided to encourage compliance with agreements through utilitarian mechanisms (see Zeitoun 2006).

Hegemonic compliance producing mechanisms within international river basins include **securitisation**, where for instance criticism of the state's position may be equated to treason; **knowledge construction**, which involves determining which discourses are politically acceptable; **sanctioned discourse**, where the discourse of the powerful state has precedence above all other alternatives; **coercive resources**, which a hegemonic state can use to resist outside pressure; **international support**, where a state has powerful friends which enable the state to mobilise funds for water infrastructure as well as enables it to attain 'a favoured political position globally'; **financial mobilisation**, where a state with financial capacity avoids donor conditions and can be able to carry out water development unilaterally; and **riparian position**, where an upstream country's use of water can affect another country's use of water. According to the hydro-hegemony theory, while given less importance, the riparian position is only form of coercive resource that is static while others may change with time and situations (Zeitoun & Warner 2006). For this particular reason, hydro-politics is a dynamic process involving on-going interactions between society, environment and culture (Cascão & Zeitoun: 2010). Moreover, while the hegemonic state may influence the dynamics in the basin, non-hegemonic states may successfully use 'bargaining power' to challenge the management regime established by the hegemonic state which is characteristically inequitable to them in most situations (see Cascão & Zeitoun 2010).

2.9 Nationalism, state sovereignty and international water management

One of the often cited impediments to international water management is state sovereignty, since it is tied to territorial integrity. State sovereignty and nationalism should be given due consideration in analysing international water management and for good reasons. This is important when mindful of the fact that sovereignty considerations and lack of a concrete framework to deal with international waters have in the past prevented serious discussions on international water management in international fora (Biswas 2008). This is also particularly true when considering that while different groups vie to influence the regime formation within international water management, politicians hold the final say (Earle et al. 2010; Cascão & Zeitoun 2010). For this reason, transboundary water management, in the view of Cascão & Zeitoun, is a political process (Cascão & Zeitoun 2010). While economic approaches may inform the states whether it is economical to cooperate, politics still dictate whether riparian states enter into a cooperative arrangement or not (see Dombrowsky 2007).

What is a nation then? What is a state? What is nationalism or what is state sovereignty? In literature, the terms 'nation' and 'state' are often used interchangeably. It is nonetheless important to highlight the distinction between the two because their differences are important to understanding the processes that are involved when these two terms are used. One important fact to note is that there are many states without a nation and some nations without a state. It is undeniable that the nation of Palestine exists for instance. However, a Palestinian State has not been in existence for a long time and the Palestinian Authority only made recent application to the United Nations General Assembly to be recognized as a state.

A nation is principally concerned with relationships, both spatial and temporal connections as well as collective identity of the citizens. On the other hand, a state is centred on sovereignty of the nation (Spencer & Wollman 2002). In classical assumptions of this sovereignty, it means that states, acting in the interest of their nations are,

> "nominally free and equal; enjoy supreme authority over all subjects and objects within a given territory; form separate and discrete political orders with their own interests (backed by their organization of coercive power); recognize no temporal authority superior to themselves; engage in diplomatic initiatives but otherwise in limited measures of cooperation; regard cross-border processes as a "private matter" concerning only those immediately affected; and accept the principle of effectiveness, that is the principle that might eventually make

right in the international world – appropriation becomes legitimation" (Held 2003: 163).[9]

If primordialism (the naturalized view of nations) is engaged to explain the origins of the nation, a state may be viewed as the creation of the nation since nations need political sovereignty in order to be as "independent as possible" (Breilly op.cit Özkirimli 2000; see also Grosby 2005; Kedourie op.cit. Calhoun 1993). The central thesis in primordialist articulations of nationalism is that nations as created by nature cannot be socially constructed. By this virtue, as human beings, our nationality is fixed or immutable. One cannot consciously choose his or her nationality as one is born into a particular nation (see Özkirimli 2000). There is thus a close association of ethnicity and the nation in primordialist notions of nationalism. By implication, nations are supposed to be culturally homogeneous or in other words their identities are culturally exclusive (see Dawisha 2002). Thus cultural differences form the basis of nations which by their nature emphatically includes a particular ethnicity and exclude all others that are unlike the ethno-nation. If these articulations of nationalism hold, then by default nations and nationalism are not viable in the African context due to the multi-ethnic nature of the states (see Markakis 1999; Eriksen 1999).

Constructivist views on nationalism on the other hand perceive nations as a consequent of social interactions and for that fact, national identities change with shifting social interactions (Dawisha 2002). To this end, national sovereignty may shift as physical realities and people's ideas change (Green Cross International 2000). Nationalism, in other words, is a "politically induced cultural change" (Dawisha 2002: 5-6). 'Enlightenment, industrialization, capitalist social relations, print-capitalism, or the state' are perceived as 'dimensions of modernity' that have produced nationhood and nationalism (Yeros 1999: 2). Culture and largely national identity are not static but are rather continually redefined in constructivist explanations, thus current security and

[9] Held citing the works of Falk 1969, Cassese 1986, and Held 1995.

developmental considerations can influence identity change. The increasing role of multinational corporations for instance in the economy, or the activities of international non-governmental organizations in development work which has been traditionally considered as an arena for the state have implications on states relations to its citizens and identity formations.

As constructivist positions on nationalism posit, national identities and hence allegiance to the nation shift with shifting social interactions. This means that individuals' allegiance to the state is not static but will shift accordingly. To this end, Eriksen argues that individuals make symbolic, political and economic investments into appropriate imagined communities such as the state or ethnicity (Eriksen 1999). As long as the state delivers, it remains the most relevant focal point for social allegiance. Nonetheless, where the state fails to deliver, the state ceases to be the focal point of social allegiance and loses its legitimacy. This is particularly valid when considering the notion of permanent sovereignty with regards to national resources where the state has to appropriate resources for the benefit of local people who are the owners of the resources. (see UN 1984).

When the state appropriates or is perceived to appropriate water resources for the benefit of other groups at the expense of others, discontent can rise among the disadvantaged groups. In situations where such differences take ethnic lines, it risks both the nation-building process and state legitimacy. This can lead to sub-national water conflicts.

All things considered, state sovereignty is preoccupied with international relations i.e. how a state relates to other states in what is termed 'external sovereignty' while nationalism, what others refer to as 'internal or domestic sovereignty', is focussed on internal relations and how individuals and groups of individuals relate themselves to the state (see Green Cross International 2000). For international water management, these two different spheres are important. Reasonably, both internal disputes, (arising from ethnicity, etc.), and inter-state conflicts have implications for international water management (Green Cross International 2000).

The recommendation to manage international waters at basin level has therefore implications for the modern nation state which tends to emphasise sovereignty and self-sufficiency (see Earle et al. 2010). Among other important factors, international water management is challenging because riparian states have first and foremost national agendas on water development (see Sadoff & Grey 2005). The states will therefore be more willing to cooperate if cooperation does not hinder their national agendas. Particularly where also water becomes scarce, the state may view water access and control as a matter of national security (Gleick 1993) which may challenge equitable use of water. How a state translates this national agenda in the international arena is also influenced by internal divisions and conflicts of interests within the nation. While a state seeks to maximise its gains in foreign engagements, it is difficult to do so at the expense of its legitimacy at national level. Therefore, the state has to reconcile international and national interests which in many cases can be rather difficult to achieve (see Dinar 2008). As a nation is not a monolithic entity, differing interests among the groups means that what constitutes national interest is also contested. Such contestations as well as shifting group interests not only affect how a state engages other riparian states but also mean that international relations have to be dynamic in order to reflect dynamic internal interests. Considering the complex number of domestic actors vying for influence in foreign policy, a non-functioning state or in the absence of robust policy processes, a state may face 'foreign-policy paralysis' (Kelly 2009).

What complicates international water management process is the notion that state sovereignty is incompatible with cooperation between states. As Green Cross

International (2000) argues, the ability of states to enter into agreements reinforces the state's sovereignty rather than diminishes it. The state has also the power to enforce international agreements at the national level. Particularly where cooperation in transboundary water resources produces mutual benefits, state sovereignty of the states involved is reinforced by such cooperation (Green Cross International 2000).

Putnam as such argues that international negotiations involve two levels. Firstly, domestic groups vie to influence the government's adoption of their preferred policies which obviously involves claims and counterclaims. Secondly, the government has to find a balance between satisfying these domestic demands at international level and minimising adverse effects of such strategies (Dinar 2008: 30). This suggests that international negotiations also involve more claims and counterclaims but with added complexity. As such, an "international system is not only a consequence of domestic politics and structures but also a cause of them" (Dinar 2008: 30[10]).

The discussion in this section suggests that sub-national, national and trans-national elements significantly influence how a state operates and enters the international arena. Therefore, the role of transnational organisations and non-governmental organisations (both national and international) and epistemic communities for instance should also not be ignored in analyses. Their essential role in consensus building, agenda making and provision of incentives to ratchet up cooperation between riparian states that may otherwise be unwilling to cooperate for various reasons is considerable (see Dinar 2008). The role of the World Bank in the Indus Water agreement, United Nations Environmental Programme (UNEP) in the Zambezi River Action Plan (ZACPLAN), and the United Nations Development Programme (UNDP) in the Mekong River Basin attest to this important fact. Moreover, the international watercourse law for instance may be used by the weaker states in the basin as a bargaining tool to moderate the activities of the powerful state. Thus, in many instances, the research community that

[10] Dinar making reference to work by Gourevitch

is academics, donors and international financial institutions also play a critical role in facilitating cooperation among the basin states (Earle et al. 2010).

How stable or fragile a water sharing agreement is depends partly on domestic policies (Dinar et al. 2007). Considering the case of boundary commissions where all shared rivers between two states are managed together, a state may choose to make concessions on one river in order to increase its gains on another river. While this may be an acceptable strategic action by the state, such concessions may not be supported by local governments, affected users and local groups since they may not directly benefit from the gains accrued in the other river basins. The main problem with issues of reciprocity in such spatial constellations is that only the state-level government (federal) has an oversight of overall gains and losses (Dombrowsky 2007)

While the water wars thesis lacks empirical evidence and therefore seen as sensationalist, political instability can result if people lack clean freshwater (Wolf et al. 2003). If a state experiences domestic conflicts for this reason as well as others, its participation in international water management may be limited particularly when the state's basin area falls under the control of rebel movements (see Chenje 2000). The Angolan situation for instance during the initiation of the ZACPLAN may fall into this category since the Angolan part of the Zambezi River Basin was firmly under the control of UNITA rebels (Chenje 2000; Turton 2008). Consequently other riparian states may continue to develop their water resources anyhow in the absence of participation of the unstable state (see Kelly 2009). This has implications especially regarding legal harm in international watercourse law, where for instance if the unstable state is upstream and has limited capacity for development of water resources, a downstream state may significantly develop water resources within its national borders. When the upstream state becomes stable and attempts to develop the water resources of an international watercourse within its borders, it may be more limited than it would have been if the downstream state had not significantly developed its water resources. Based on the provisions of the international watercourse law, all relevant factors have to be considered in order to determine what uses can ensue in an upstream state in relation to the developments that have taken place in a downstream state (see McCaffrey 2007). On the other hand, a state that is increasingly facing water scarcity and is thus prone to domestic discontent may opt to develop international waters unilaterally at the expense of political risks externally, particularly when such scarcities exacerbate internal conflicts (Biswas 2008). In this light, the analysis of inter-state relations should not undermine the internal dimensions of the states and how they can possibly influence a particular state's participation in international water management.

2.10 Summary

This chapter has stressed the importance of incorporating the assessment of the physical environment in water management studies. While there are many theories that can be used to explain international water allocation practices, water management as well as conflict and cooperation in international river basins – where the physical environment is ignored in such explanations – they run the risk of omitting other critical factors that may lead to a better understanding of the working mechanisms of the hydro-political relations and overall management of international waters. By taking physical geography as a given or mere physical space for social interaction, it is rather difficult to explore how the physical aspects impact social interactions and vice versa.

The conceptual framework of water-society systems importantly forms the overarching theoretical framework due to the relevance and fundamental importance of the three analytical layers embedded in this conceptual apparatus. The relationship between basin geography and hydrological cycle (the natural) on the one hand, and human-induced modifications on these important aspects on the other, as well as linkages to institutional and conceptual dimensions enables a comprehensive analysis of the social and physical dynamics in the basin. Thus, while the study utilises the concepts of strategic interaction and hydro-hegemony to various degrees, the study aims to maintain its focus on the fundamental role that the hydrological cycle and basin geography play in international water relations.

From first impressions, the conceptual framework of strategic interaction and other water cooperation theories may seem contradictory to the theory of hydro-hegemony, thereby raising questions about their joint use in a single study. Within strategic interaction, basin geography is the starting point as opposed to the lesser position that it occupies in hydro-hegemony theory. Furthermore, in conventional cooperation theories, states are alleged to freely cooperate based on their interests and that such cooperation mitigates conflict. On the contrary, cooperation within hydro-hegemony theory only ensues based on the interests of the basin hegemon, and lack of conflict is largely due to the weak position of the other riparian states to challenge the hegemonic state. Nevertheless, this contradiction should not mean much for this particular study for the simple fact that the study period is long and presents different political and social configurations in the basin over the last 100 years. This can facilitate use of different theories for different periods depending on the prevailing social and political configurations in the basin. Moreover, water management is complex as are international water relations, and as such, it is possible for a state to adopt different strategies to different water issues or riparian states depending on the prevailing geographical, social, economic and political relations. Thus, while differing in their core arguments, these theories may still be used side by side.

A number of water management concepts have also been reviewed in this chapter. While some scholars have taken pessimistic views on international water relations (i.e. water wars), other scholars have embraced optimistic views. Rather than states engaging in violent conflicts with each other within basins, these scholars argue that water will become an important bridge for international cooperation. From the concept of 'water can be a pathway to peace' to the concept of strategic interaction, these theories show that states cooperate when it is in their interest to do so. Furthermore, unlike pessimistic views on international water relations, these theories advance the argument that cooperation is not an anomaly.

This chapter has also highlighted the increasing criticism of the wholesome acceptance of cooperation in conventional analysis. Theories such as hydro-hegemony argue that such unquestionable acceptance of cooperation overshadows the nature of interaction between the riparian states which can be dominative and manipulative in some instances. The implication of this argument is that not all forms of cooperation may be desirable. Furthermore, not all riparian states may benefit from the established cooperative agreements and water management regimes and some riparian states may be harmed by such agreements. Unlike those theories advanced by Wolf, Dinar and others, cooperation within hydro-hegemony is guided by the hegemonic state and is designed to promote the interests of the hegemon. While this theory seem to differ from many conventional theories on conflict and cooperation in international watercourses, its core arguments will enable further scrutiny of developments in the Zambezi River Basin by analysing how states put together the agreements in practice.

Chapter three

Taming the Zambezi River: The development of big dams in the Zambezi River Basin

Available literature and international water discourses in Southern Africa suggest that international water cooperation in the Zambezi River Basin has generally been weak (see Chenje 2003; Wolf et al. 2003; Kirchhoff & Buckley 2008). This thesis will argue that a long term historical-geographical perspective taking into consideration the hydro-geography of the basin, reviewing the timing and mode of execution of the big dams in the basin in relation to the decolonization processes and internalization of the basin, make it possible to highlight how the subsequent developments contributed to the shaping of international hydro-politics in the region.

This chapter attempts to demonstrate that the current water architecture in the Zambezi Basin has to be understood as a product of historical complexities and largely influenced by both the geographic configuration of the basin as well as the timing and mode of initiation of the two largest hydropower projects in the basin. In other words, the attempts by the colonial governments to address the question of geographic asymmetries as well as changing these geographies by means of waterworks in order to maintain a competitive edge over other powers in a quest to modernize their countries, influenced how water resources developments were undertaken. It will also be further discussed how the South African apartheid regime took advantage of the combined effect of the historical complexities and social fragmentation in the basin states to maintain its competitive advantage and sustain its hold on power, which negatively affected water resources development in the basin.

In the long history of the Zambezi basin, the second half of the twentieth century, particularly between the 1950s and 1970s, was a revolutionary period in terms of water management in the basin. It was during these few decades that the colonial governments commissioned the large dams in the basin (see WCD 2000; Scudder 2000; Scudder 2005; Soils Incorporated (Pty) Ltd et al. 2000). Understudying the significance of this period affords a researcher the opportunities to explore intricate relationships between geographic asymmetries and various riparian positions on one side and power dynamics on the other and how such relations have shaped both the energy and water architecture in the Zambezi River Basin. It will be shown in this chapter that large scale hydropower projects are rarely assessed as merely technological or engineering projects. They are definitely political, economic, social, and environmental projects as well as engineering projects. It is therefore important to assess them from various perspectives.

Some scholars have argued that the development of the Kariba Dam, a joint initiative of Zimbabwe and Zambia, provided a platform for basin-wide cooperation (see Chenje 2000: 265). This thesis will however argue that the development of the Kariba Dam had more complex effects and that in a wider perspective, it is more appropriate to argue that it has contributed both negatively and positively to international water management and general international relations in the Zambezi River Basin. On the one hand, its development stimulated nationalist attitudes and the management of the Zambezi Basin as disparate entities. On the other hand, its development has indeed facilitated the cooperation between the two basin countries Zambia and Zimbabwe within different and difficult political configurations and relations from which important lessons can be drawn.

3.1 Initiation of hydropower projects in the Middle Zambezi River Basin

Officially opened by Her Majesty Queen Elizabeth on 17 May 1960 (Tumbare & Mukosa 2000), the Kariba Dam, constructed between 1956 and 1959 on the border between Zambia and Zimbabwe, is a double curvature concrete arch with a height of 128 metres and a crest length of 617 metres. The width of the dam at crest is 13 metres and at the base is 24 metres exhausting almost 1,032,000 cubic metres of concrete for the construction of the dam wall. The dam has six flood gates, each measuring 9 metres by 8.8 metres. At maximum retention ratio, each flood gate can pass 1,574 cubic metres of water per second. The reservoir behind the dam is 280 km in length with a width of 32 km at the widest point. The surface area of the reservoir is 5,580 square kilometres at minimum operating level and has a catchment area of 663,880 square kilometres[11]. It is crucial to acknowledge the enormous size of the dam in order to appreciate its historical importance.

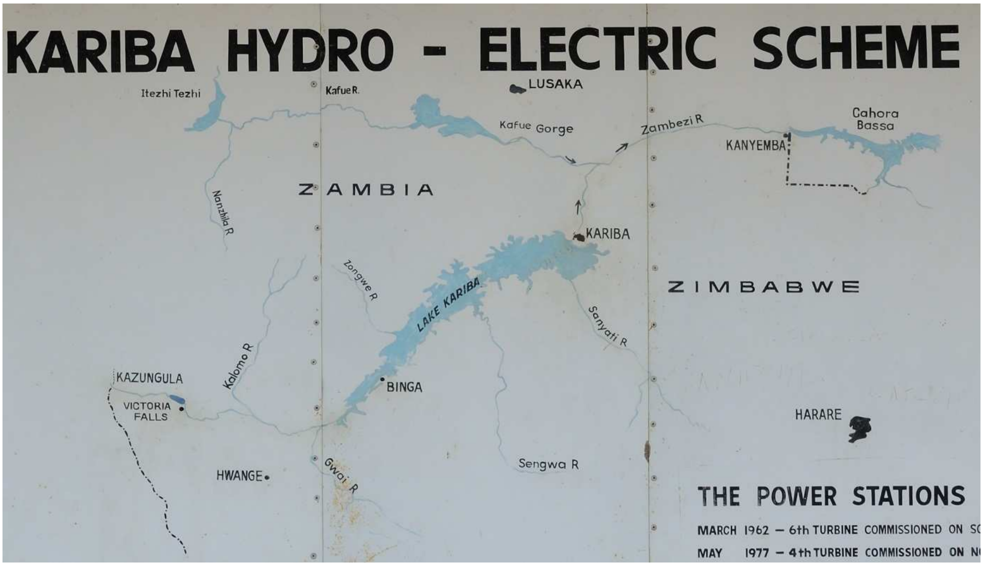

Figure 4. A sketch of Hydro-electric power dams in the Middle Zambezi
(Information plate at the Kariba Dam)

Some scholars have convincingly argued that the construction of the Kariba hydro-electric power dam was the pivotal moment in international water management in the Zambezi River Basin (see Turton 2008). In order to understand why big dams were

[11] Information obtained from the information plate mounted on the south bank of the dam wall

initiated in the Middle Zambezi and specifically why the Kariba Dam HEP was developed by the British as opposed to the Kafue HEP project, a competing project at that time, a number of factors, both physical and social should be explored. This analysis will also contribute to the understanding of why the decision to develop large hydropower projects in the Zambezi River Basin only took place after the Second World War, even though the HEP potential was well known for several years. Furthermore, this also provides a basis for understanding how post-colonial hydro-politics have been framed and executed by various governments in the basin.

Even though the hydropower potential in the Zambezi River Basin was well known by the British for many years, no developments were undertaken. Data on the Zambezi River and Kafue River flows was documented since 1905 when the Rhodesia Railways started collecting it for water levels at Kafue Railway Bridge and Victoria Falls Bridge (Tumbare & Mukosa 2000). These data contributed to the assessment of the hydropower potential of the two rivers. Nevertheless, a number of reasons contributed to the lack of development of hydropower, including a limited industrial base to consume the electricity produced, the need for huge capital investments, limited transmission capacity, etc. Sourcing capital to develop hydropower was particularly limiting.

Although dams have been controversial in international and regional debates on development and humans' relation to nature due to their unintended social and environmental impacts, the contribution of dams to economic development has also been well documented by many scholars (see for example Obeng 1977). Dams have been used as a tool for water management to achieve a variety of uses such as provision of water for irrigation, responsible for around 30 -40 per cent of the total land under irrigation by 2000 (WCD 2000). By the year 2000, the total price tag for large dams was pegged at USD 2 trillion worldwide (see WCD 2000). The proposal to develop hydro-electric power in the middle of the Zambezi in the 1950s coincided with the era when dams were considered a symbol of modernity and human progress in harnessing nature for the development of mankind (WCD 2000). As WCD (2000) reports, these sentiments were very strong in the period between the 1930s and 1970s when on average two to three large dams were commissioned daily at the global level by the 1970s (WCD 2000).

The development of hydropower projects has also been influenced by site suitability, meaning, of course, that such developments cannot just be developed on any part of the river course. During the initial developments of the hydropower projects, beneficiary projects had to be sited close to the hydropower projects; from the milling machines to the city lights around the power station (see Kumar et al. 2011). This geographic requirement disadvantaged hydropower developments in the past, particularly when the technology to transmit electric power over long distances was in its infancy (Showers 2011). It was fundamentally the advancements in transmission technology over long distances that opened up the possibility of any of the potential sites in the middle Zambezi River Basin to supply power both to the Northern and Southern Rhodesia.

The outlook to develop hydro-electric power in the 1950s in the British territories in Central Africa was therefore well placed. The hydraulic mission was in full force. Developing this hydropower potential was part of a global discourse to bring modernity to societies through development and economic transformations. The rapid development of the copper belt in Zambia and its high demand for power as well as increasing industrialization in Zimbabwe necessitated huge investments in power development that was cheap and stable (Soils Incorporated (Pty) Ltd et al. 2000). Transportation over long distances (approximately 750 Km) of coal from Hwange in Southern Rhodesia as well as far as South Africa coupled with the use of a single track railway line proved to be inadequate to meet the high energy demands at the copper mines (Soils incorporated (Pty) Ltd et al. 2000; Scudder 2000; Hance 1954; Clements

1960) which were at this particular time met by wood and coal (Mihalyi 1977). Particularly for copper, increased demand resulted from the drive to industrialize after the Second World War which also boosted cooper prices on the global market (see Soils Incorporated (Pty) Ltd et al. 2000). Justification of a grand scheme such as the Kariba Dam was therefore easy at the time, considering what the project was expected to contribute to the British territories in Central Africa.

When the Kariba Project was given a go ahead in 1955, one of the significant project financiers was the Colonial Development Corporation and therefore brief description of its establishment is given here. This is pertinent since the establishment of the Colonial Development Corporation, just as the big dams themselves, were driven by the global and regional push to modernize. Importantly, its discussion here also aims to highlight an important fact that the development of the big dams was not solely driven by the local needs to modernize, but was also a consequent of developments occurring at a much wider spatial scale. The Colonial Development Corporation (CDC) was created by the 1948 Overseas Resources and Development Act to provide financial assistance to colonial projects that were commercially viable (Wicker 1958). This was intended to supplement the ordinary colonial development funds which were used as a social overhead capital and not meant for bankrolling huge projects such as hydro-electric power plants. This development implied that infrastructural developments such as the Kariba or Kafue would receive serious consideration for potential funding. The Colonial Development Corporation changed its name to the Commonwealth Development Corporation in 1963 owing to the decolonisation process and strong criticism of European colonialism which was at peak during this period. The institution is currently known as the CDC Group.

The introduction of the Overseas Resource Development bill was nevertheless not a mere coincidence. It was a response to the high need for capital resource development as rebuilding efforts intensified after the Second World War. In order to address the rising demand in Britain for raw materials, production in the colonies needed to improve. British Central Africa became one of the key spotlights in the British Empire because of its hydropower potential and huge copper deposits. Copper production in Northern Rhodesia, an important source of copper in the empire, was unable to meet market demand after the Second World War.

3.2 International water cooperation in colonial times

Responding to the need to develop new sources of energy in British Central Africa, the Inter-Territorial Hydro-Electric Power Commission (ITHEP) was instituted in 1946 to conduct investigations into the feasibility of carrying out hydropower developments on the Kafue and Kariba gorges (Soils Incorporated (Pty) Ltd et al. 2000). The ITHEP was instituted by the Central African Council, established in 1946, to coordinate common services in British Central Africa, following a recommendation by the Royal Commission which was created by the British Government in 1938 (Tumbare & Mukosa 2000). The Central African Council in 1948 in Salisbury (Harare) proposed an international forum where water rights for the territories could be discussed and allocated accordingly as well as exploring the means to establish a river authority (Barkved 1996). In addition, the Central African Council appointed a four-member advisory panel in 1948 consisting of two civil engineers and two electrical engineers in the same year for the purpose of assessing projects on the Zambezi and Kafue Rivers in terms of their merits (Tumbare & Mukosa 2000; see also Soils Incorporated (Pty) Ltd et al. 2000). The international forum failed to take place on the grounds of costs, but one can also argue that, since the proposed water works were upstream, where the Portuguese had limited control, the British were less incentivised to engage a lengthy process of close coordination with the Portuguese, a downstream administration. Nevertheless, the plans to exploit the Zambezi River afforded the first real opportunity to initiate coordinated management of the international waters among different powers, but it was never seized. A confidential meeting was held in 1949 in Johannesburg drawing representatives from the British territories and centred on water development issues in the British territories (Barkved 1996).

Even though the British intended to limit the involvement of other powers in the development of water resources in the Middle Zambezi, they still considered the geopolitical advantage that Portugal had in Portuguese East Africa (Mozambique). The export-oriented economies of the two Rhodesias and Nyasaland were geographically disadvantaged without Portugal's cooperation in Mozambique. In consideration of the imperial and geopolitical relations, the British therefore used containment strategies in order to successfully develop hydropower in the middle section of the Zambezi Basin with minimal to no resistance from Portugal. Other than Portugal as the other power in the basin, the South African Government administered South West Africa (Namibia) but was unlikely to oppose the British Government's plans to develop hydropower in the Zambezi Basin. The government in South Africa had vested interests in other river basins and it was in the interest of the South African Government to limit the number of interested parties in those basins (Chenje 2003: 197)[12].

The limited involvement of Portugal by the British in the proposed development of the Kariba and Kafue HEP projects might be understood within the framework of Zeitoun's "hydro-hegemony"-framework. Zeitoun argues that the theory of Hydro-hegemony is applicable when there exists power asymmetry between the states; control of flow is consolidated by the hegemon; and competition for the resource is suppressed (Zeitoun 2006). The first task is to analyse the Anglo-Portuguese relations in this part of Africa.

The limited territorial expanse of Portugal was, however, not only because they were suppressed, but because they chose not to be very interested. Even though Portugal was the first European power to annex colonies in Southern Africa, its expanse was restricted in part due to Portugal's primary interest in the gold trade which limited its advancement into the interior of the continent, as Portugal only aimed to control the

[12]Chenje quoting a letter to the Secretary to the Prime Minister of Southern Rhodesia by A. E. T. Benson of the Central African Council

trade routes (see Tindall 1968). Nevertheless, the Portuguese harboured also some interests to use the interior rivers for navigational purposes (see Pachai 1973). The asymmetric power relations between Britain and Portugal also played a role. The British expansion of their territory and control of the Portuguese influence in the interior of Africa in order to accommodate British interests were facilitated by its aggregated power in the face of opposition from Portugal. This was well evidenced at the peak of the scramble for Africa in the 1880s, when Portugal attempted to expand its colonial territory inwards by connecting its two coastal territories, which would have stifled out advancement of the British sphere of influence northwards. The Portuguese Government signed agreements with the French in May 1886 and the Germans on 12 December 1886 giving the rights to Portugal to expand its colonies inland (Keltie 1890). This was objected by Britain and never materialized and Britain got the upper hand because they had aggregate power in the form of military, economic and political strength which it used successfully to deflate Portuguese interests.[13]

As it has been pointed out in the previous chapter, some scholars argue that a river basin is less likely to have a cooperative arrangement when a hegemon occupies the upstream riparian position. The case of the Zambezi brings forth that the issue might be less straight forward. The fact is that Britain, with its upper hand over Portugal, involved the Portuguese in the developments in the middle of the Zambezi even though limitedly in spite of the fact that the British were in an upstream riparian state, the basin hegemon as well, and could control the flow. They could unilaterally control the flow without somehow involving the Portuguese in the planning phase. The limited involvement can partially be explained by the position of the British territories in the basin as well as their hegemonic position. As already stated, the Portuguese involvement can be understood as a containment strategy. While the British had everything to gain, the Portuguese would gain little to nothing from this development. As Zeitoun puts it, containment strategy is where "demands of competing riparians are

[13] Newitt writing on the Anglo-Portuguese relations, where by the former usually placed ultimatums on the latter in resolving a particular issue of interest to the former. (Newitt 1981)

co-opted through administrative or legal means" (Zeitoun 2006: 239). The agreed minimum flow release of 283 m^3/s (see Soils Incorporated (Pty) Ltd et al. 2000) agreed between the Rhodesian Governments and the Portuguese East African government at a technical conference held at Victoria Falls on 31 May 1950 was negotiated in British interests. There was no agreement for instance on flood releases and how to handle them even though such releases would have consequences in the Portuguese territory.

For the Portuguese, the development of the Zambezi River needed to consider various types of water uses such as hydropower, navigation, irrigation and so on. In the view of Engineer-Chief Inspector Viriato de Noronha de Castro Cabrita, who was the leader of the Portuguese delegation at the technical conference, the way the British approached the development of the Zambezi River reduced the issue of river management to hydropower development (Barkved 1996). Notably, development of the dams for hydro-electric power generation in the Zambezi provided an opportunity for integrated development of water resources by incorporating flood control measures, irrigation and fisheries, environmental conservation etc (see Scudder 2005). This clearly shows that what was agreed at the technical conference was not in the interest of Portuguese East Africa but rather in the interest of the two Rhodesias.

The hydro-politics in the Zambezi River Basin were nevertheless such that Portugal had no sufficient power to push for a greater influence on the British water development plans in the Middle Zambezi, as noted by the Federal Ministry of Power (Chenje 2003). What should be noted is that even though powerless and economically weak, Portugal had the means to slow down the development of the Kariba by employing a number of tactics, i.e. increased control of its ports to slow down movement of some materials to the dam sites as counter-hegemonic strategies. Historically, the Portuguese in Mozambique used their geopolitical advantage at the outlet of the river and frustrated British activities inside the continent and upstream through strategic control of river transportation as well as coasts, imposition of a wide range of tariffs, and bureaucratic processes (see Kampanje-Phiri 2010). It was therefore in the interest of Britain to maintain cordial relations between Britain and Portugal in this part of Africa in order to facilitate economic activities in the colonies.

Occupying a downstream state, the Portuguese were more interested in a holistic approach to the development and exploitation of the Zambezi River waters. This Portuguese interest is in line with most downstream states in many river basins, since downstream states are in general more concerned with long-term strategies and collective management of the basin than upstream states (see Dinar et al. 2007). The particular attention given by the Portuguese to irrigation can also be explained by the higher potential that exists for irrigated agriculture in the extensive flood plains in Mozambique (see Church 1968).

What is important to highlight in the Anglo-Portuguese cooperation in the development of the Middle Zambezi in the 1950s is that the British never sought mutual cooperation from the Portuguese. The whole idea of engaging them was to contain the Portuguese from potentially derailing the progress of the Kariba development. As a hegemonic power, the British chose to co-opt the Portuguese into the planning phase of hydropower developments in the Middle Zambezi in order to achieve compliance rather than coercion. This was not an engagement of equal powers but rather one power exerting its hegemony over the other. Britain was well connected financially and politically among its western peers that enabled it to plan such huge projects which were beyond the reach of Portugal at this particular time. The British also engaged the Portuguese during the same period on the proposed Shire Valley Scheme in Nyasaland (Malawi) in what might have been considered a territorial project. This arguably was another strategic tactic to further divert the Portuguese attention from the Kariba HEP development in consideration of consequent hydrologic changes.

The purpose of the Shire Valley scheme was to regulate the flow of the Shire River, stabilise the level of Lake Malawi (formerly known as Lake Nyasa), develop hydro-electric power, reclaim swamps, as well as irrigate areas above the swamps in the lower Shire valley, in Nyasaland (Richards 1954). Consulting engineers of Westminster, Sir William Halcrow and Partners, were contracted in 1950 to conduct a study and draft proposals for the Shire Valley scheme at a cost of 300,000 British Pounds, to be met by the governments of Nyasaland and the United Kingdom (United Nations Treaty series 1953).

The proposal to develop the Shire Valley Scheme was a result of a number of studies that demonstrated that the agricultural productivity could be improved in the valley by employing a number of activities. The studies highlighted that agricultural productivity in the valley was hampered by the Shire River flow variations and flood regimes, as the variations of the flow affected the extent of the land that could be put under cultivation. The fertile and productive parts of the valley were completely submerged during the long periods of floods or in periods of high precipitation in the basin, which extended the extent of the swamp, therefore necessitating measures to reclaim land from the swamps. During long periods of dry weather, overbank floods were limited, and this limited the extent of the land that could be put to productive use (see Kampanje-Phiri 2010). Unlike the Kariba or Kafue projects, the Shire Valley Project was a multipurpose project with the agricultural component as the core project and hydropower component as a side project, mostly incorporated to attract financial investments into the project.

In an attempt to secure more Portuguese cooperation in the region, the British agreed with the Portuguese at the Exchange of Notes in 1953 for Portuguese participation in the management of Lake Malawi and the Shire River and that, through their participation, they were liable for one third of the costs including for those studies that were already conducted. If so willing, the Portuguese would also be allowed to participate in the development of hydropower on the Shire River. However, their share of the project would be in proportion to their contribution but could never exceed the one third portion of the project (Barkved 1996). Other than the stated intended developments in the Shire Valley Scheme, the British also intended to provide a sufficient amount of water to Mozambique to offset or compensate for any reductions in water that may arise as a result of filling up the Kariba Dam[14] (Barkved 1996). Moreover, the British had still navigational interests and intended to develop the Shire-Zambezi waterway in the future in which Portugal as a downstream power in the basin had the advantage.

The problem with the initial international water projects in the Zambezi River Basin was that the negotiations and considerations involved only two major powers, the British and the Portuguese. Because the British could treat their territories collectively, as a consequence of the Federation of Rhodesia and Nyasaland, they were able to make concessions in one territory of relatively less importance to them in order to make gains in others. However, this British hydro-political strategy has influenced post-colonial hydro-political relations for some of the states in the basin as a result of internalization of the basin in the post-colonial period. The 1953 exchange of Notes held in Lisbon, Portugal, in part re-demarcated the borders between Malawi (Nyasaland) and Mozambique as the British and Portuguese agreed in principle to shift the north-eastern border between Nyasaland and Mozambique from the edge of the lake to the median (United Nations 1953). Lake Malawi therefore transcended from just a part of a shared basin to a shared territory, as Mozambique through the 1953 agreement gained territory of 2,496 square miles of land and water surface with an additional 23 and two square miles around Lake Chiuta and Nsanje areas respectively (USAID 1971). These were concessions that were made for the better interest of the hydropower developments in the Middle Zambezi from which Nyasaland was unlikely to have any returns. The 1953 border adjustments between Malawi and Mozambique also continue to be a controversial issue between Malawi and Tanzania. The

[14]Governor of Nyasaland to the Secretary of State for the Colonies, 20 October 1950, op cit.

Tanzanian Government argues that the border between the two countries lies on the median as opposed to the edge of the lake just as those between Malawi and Mozambique.

The selection of the Kariba HEP project over the Kafue HEP project nevertheless had nothing to do with the Anglo-Portuguese relations. This was dictated by internal politics within the British territory in addition to the implications of successive and contiguous configurations of the river as is discussed in the following sections.

3.3 Feasibility studies and politics surrounding the Kafue/Kariba HEP projects

Since its institution in 1946, the Inter-Territorial Hydro-Electric Power Council (ITHEPC) per its mandate released a report in 1951 on the feasibilities of developing either the Kafue or Kariba HEP project which was prepared by the advisory panel in 1950 (Soils Incorporated (Pty) Ltd et al. 2000). The ITHEPC in its report recommended the development of the Kariba project. This was echoed in a report by consultants Halcrow, Gourley, Pickworth and Kennedy released in 1951 who carried investigations on hydropower development on the Kafue River in 1950 on the request of the Government of Northern Rhodesia (Barked 1996: Clements 1960). Various studies were also conducted in the early years of the 1950s that drew different recommendations for the two projects, consequently complicating the selection process. The Northern Rhodesia Government requested Sir William Halcrow and partners to conduct another study and issued a report which indicated that the Kafue HEP project would be initially cheaper but more expensive than the Kariba in the long run (Clements 1960).

In 1951, the ITHEPC suggested to the governments of Northern and Southern Rhodesia the establishment of a Zambezi River Authority for the purposes of managing the common waters of the two states (see Soils Incorporated (Pty) Ltd et al.

2000; Tumbare & Mukosa 2000). However, the government in Northern Rhodesia was not keen on the developments on the Zambezi River main channel as it preferred the development of the Kafue HEP project, and subsequently hindered the creation of the Zambezi River Authority (Tumbare & Mukosa 2000: see also Scudder 2000). In 1953, the government in Northern Rhodesia established the Kafue River Hydroelectric Authority to oversee the developments on the Kafue Gorge (Soils Incorporated (Pty) Ltd et al. 2000). The Southern Rhodesia Government, just like Northern Rhodesia, also attempted in 1952 to secure funding single-handedly for the development of the Kariba HEP project but with no success (Mukosa 2000). The Southern Rhodesia Government therefore in principle agreed in 1953 to develop the Kafue project first, despite the fact that both studies conducted by Sir William Halcrow and Partners and the Inter-territorial Hydro-electric Power Commission favoured Kariba in their recommendations (see Hance 1954). The Kafue HEP project was prioritised among other reasons due to the higher costs for developing the Kariba HEP project (Soils Incorporated (Pty) Ltd et al. 2000; Barkved 1996).

By analysing the agreement between the governments of Southern Rhodesia and Northern Rhodesia on the prioritisation of the Kafue development, some clever higher level politics at play can be revealed. This was the year the contentious Federation of Rhodesia and Nyasaland (see the following sections) was established amidst scepticism from Africans and some colonial government officials alike in Northern Rhodesia and Nyasaland. Any recommendation of projects that seemed to largely benefit Southern Rhodesia where the Federal Government was seated would therefore be problematic because of the huge opposition to the Federation in the northern territories. Prioritising the Kariba project outright over the Kafue Project would have therefore vindicated those sceptics. This might also explain why the British Government wanted assurance from the Federal Government that Nyasaland would not suffer as a result of the implementation of the Kariba project (Barkved 1996).

Importantly, the conditions set for implementing the Kafue Project were prohibitive i.e. the need for the Northern Rhodesian Government to raise the capital required to implement the project without seeking funds from the International Bank of Reconstruction and Development (IBRD), the London Market, and the Common Wealth Finance Corporation (Barkved 1996). However, the British Government was well aware that funds for any of the projects would likely come from such institutions like the IBRD (Barkved 1996) and that through their vetting process, the Kariba project was the mostly likely to be approved. Classified as a territorial project, the Northern Rhodesia Government did not have the capacity to mobilise financial resources for the Kafue HEP project as the Federal Government could. The Southern Rhodesian Government thus appreciated the fact that the Federal Government was the only institution that was creditworthy to raise the huge capital required to undertake any of the projects in question (Clements 1960; McGregor 2009). As such, the Southern Rhodesian Government may have only agreed with the Northern Rhodesian Government to develop the Kafue HEP project first, as a ploy to help the Federation Government overcome its initial opposition so that it became a stable platform for raising capital for large-scale infrastructural developments.

Initially, the Federation applied to the World Bank for a loan in December 1953 for the development of the Kafue as well as the development of the first phase of the Kariba HEP project, when the Federation was established that year (Tumbare & Mukosa 2000). Following the establishment of the Federation, the Federal Hydro-electric Power Board was established in 1954 to oversee both the generation and supply of electricity within the territory of the Federation (Soils Incorporated (Pty) Ltd et al. 2000; Tumbare & Mukosa 2000).

Later studies conducted by the Anglo-American Company in 1954 as well as external experts from Electricité de France raised the expected initial outputs to 450 MW and 616 MW and potential output at full operating capacity to 768 MW and 1,232 MW for the Kafue and Kariba Projects respectively. The estimated costs for the Kafue project were 36.5 million British Pounds for the first phase as compared to 53 million British Pounds for the Kariba while the total cost for the Kafue Project after completion of the second stage would be 55 million British Pounds as compared to 86 million British

Pounds for the Kariba (Barkved 1996). In each case, the production figures for both schemes improved to a degree, and it no longer became a question of which one was better but rather which should come first.

The establishment of the Federation of Rhodesia and Nyasaland in 1953 made the choice of the Kariba project over the Kafue project more plausible. The ability to generate private investor interests with the Kariba under the Federation sidelined any immediate interests in the Kafue Project, which was viewed as a territorial project (Soils Incorporated (Pty) Ltd et al. 2000). The institutionalisation of the Federation also made the Kariba Project preferable to the Kafue Project for other political reasons. Instituting the Federation in the wake of growing African opposition stimulated the nationalist movements in the northern territories, since the Federation symbolised the settlers' desire to sustain colonial rule. Additionally, most of the Africans in the northern colonies detested the racial practices that were the order of the day in Southern Rhodesia, where the Federal Government was to be seated (Pike 1968). The growing opposition from nationalist movements therefore signified stability issues in Northern Rhodesia and rendered the business environment in the northern territories questionable. Northern Rhodesia therefore seemed progressively an awkward choice for major investments, making the Kafue project less preferred in such a political environment (see Clements 1960).

The Federal Prime Minister, Godfrey Huggins (later Lord Malvern), who was very influential in Southern Rhodesian politics, took decisive actions to ensure that the project would be controlled by the Southern Rhodesian Government. Heading the Federal Government, he requested further studies on the Kariba and Kafue projects. To the disappointment of the Northern Rhodesia Government, Andre Coyne, a French expert working on recommendation from the IBRD recommended that the Kariba Project should start first (Barkved 1996; see also Soils Incorporated (Pty) Ltd et al. 2000). Coyne stated that it was possible to achieve a lower cost per unit of power for the Kariba HEP project as compared to the Kafue, by implementing design changes to the Kariba Dam from a buttress-type dam to a double curvature arch and effectively also simplifying the project in comparison to the first design envisioned (Tumbare 2000). The Federal Prime Minister as such disregarded the earlier agreement between Southern Rhodesia and Northern Rhodesia to develop the Kafue HEP project first, arguing that in the long term, the Kariba project would be cheaper and that even if the Kafue project was to be developed first, the Kariba HEP project would still be needed (Clements 1960). Following the Federal Prime Minister's decision to develop the Kariba HEP first, large protest meetings took place in Northern Rhodesia (Soils Incorporated (Pty) Ltd et al. 2000) which further encouraged nationalist movements.

Some of the administrators in Northern Rhodesia accused the Federal Government of playing with the figures in order to turn the selection process in favour of the Kariba when the actual costs would have favoured the development of the Kafue project (McGregor 2009). Furthermore, the planned location for the first powerhouse was on the southern bank of the river, a territory of Southern Rhodesia which tipped the balance of power in favour of the Southern Rhodesian Government (Austin 1968). Even though the Northern Rhodesian Government and business people protested the choice of the Kariba HEP project, the Federal Government had the final say since the funds had to be borrowed in its name. It was also impossible for Northern Rhodesia not to go along with the decision to develop the Kariba HEP project first, since it lacked funds to develop the Kafue project unilaterally as its economic muscle was not even at par with that of Southern Rhodesia. In this case, by utilizing Zeitoun's Hydro-hegemony, only the Federal Government had the ability to implement large infrastructural projects and thereby "changing hydraulics of the resource and creating new hydrostrategic and hydropolitical realities" (Zeitoun 2006: 238-239). These hydropolitical realities contributed to international water relations in the basin as further discussions shall reveal.

Following the selection of the Kariba HEP project, the International Bank of Reconstruction and Development agreed to release £28.6 million for the first phase of the Kariba Project as announced on 21 June 1956 (Soils Incorporated (Pty) Ltd et al. 2000; Barkved 1996: 35). Other sources of funding for the project came from the Colonial Development Corporation to the tune of £15 million, the copper companies to the tune of £20 million, the Federal Government amounting to £5 million, Banks to the total of £4 million and so the British South Africa company, and the Commonwealth Development Finance Company a sum of £3 million (Soils Incorporated (Pty) Ltd et al. 2000; see also Scudder 2000). This was a piece of history in itself as it was the first large dam to be financed by the World Bank through IRBD in Africa (Scudder 2005). Moreover, the Kariba represented the largest loan ever given to an African project to that date by the Bank (Scudder 2005).

The Italian engineering firm Impresit was awarded the civil works contract to construct the dam and powerhouses, while the Rhodesia Power Lines Limited, with an Italian firm SAE as a major project participant, was awarded a contract for the transmission lines (Tumbare 2000). Preparatory works such as road construction to the project site and award of contracts took place in 1955 while construction of the Kariba Dam wall and powerhouse took place between 1956 and 1959. The first units of electricity were sent to the copper belt in Zambia by the end of 1959 (Tumbare & Mukosa 2000; Tumbare 2000). The civil engineering contractors, Impresit, managed to finish construction ahead of schedule (Scudder 2005) allowing impoundment to start in 1958 and filling of the Lake Kariba for the first time in August 1963 (Mukono & Mulendema 2000).

The need to increase copper production at the copper belt in North West Zambia necessitated hydropower developments in the Zambezi River Basin. While the proposed Kafue project was sufficient to address the energy requirements of the copper belt and other enterprises in both the Northern and Southern Rhodesia, it was the Kariba HEP project that was eventually developed. This raises the need to explore why such was the case and both social and natural factors are analysed in order to highlight the underlying factors. From the discussion above, it is evident that hydropower projects are not just economic and developmental projects but they are also political; therefore there is need to explore the cultural and political context under which the Kariba HEP project was developed. Such discussions should also importantly not overlook the geographic contribution to the selection of the Kariba HEP project.

3.4 The era of the "hydraulic mission"

In order to increase our understanding of the reasons why the development of the Kariba HEP project was prioritised, it is also necessary to explore the prevailing ideas of water during this period. The water resources management paradigm at this particular time favoured the development of grand water projects. Some scholars classify the period between the end of the nineteenth century and late twentieth century as the 'era of the grand water schemes' (see Molle et al. 2009). This was an era where hydro-engineering works would solve development problems and usher societies into the modern era. What this means is that large, complex and highly challenging water engineering projects provided a great appeal within the engineering world as well as among investors. This suggests that water management was highly techno-centric during this period. With every success of such works, the idea that nature could be conquered and tamed was reinforced (see Folke 2003b).

A strong coalition of "politicians and civil servants, multilateral and bilateral financial institutions, and parastatal agencies and private sector engineering firms" pushed for the development of large dams as a viable development strategy for political, social and economic gains (Scudder 2005: 5). Dams were therefore a symbol of human ingenuity or rather the excellence of western science and engineering over nature (see Isaacman 2005). Waterbury details the evolution of the hydro-engineering works in

Egypt over the Nile and how the construction of the Aswan High Dam finally tamed the Nile bringing the much needed water security from external threats while at the same time providing cheap and reliable electricity to usher Egypt into modernity through industrialization (Waterbury 1979). To the nationalists, such projects for their gigantic size and monumental nature represented progress and helped to bring political legitimacy (see Waterbury 1979). In colonial politics, taming once mighty and impassable rivers to well-regulated and predictable ones provided much gratification to the engineers while simultaneously serving political justification for colonialism as the westerners' noble role to enlighten and elevate the living conditions of the Africans (see McGregor 2009). Where it suited, engineers and engineering firms were willing to cut profits as long as a proposed project provided a new engineering challenge that could help build the profile of the engineers and their respective firms (see Middlemas 1975). This water management paradigm played in favour of the Kariba Dam in comparison to the Kafue HEP project.

From a financial perspective, the implications were that international financial institutions like the World Bank favoured complex and large water engineering projects (Clements 1960; McGregor 2009). Waterbury for instance alluded to Eugene Black, president of the International Bank of Reconstruction and Development (IBRD) as being "favourably disposed towards large hydraulic projects" (Waterbury 1979: 103). This appetite for large and complex dams can also be explained by the persistent pressure on the Bank's staff to move funds and as such favour large, costly projects which necessitated movement of large sums of funds (see Scudder 2005). The disadvantage in this water management paradigm was that more suitable projects could be side-lined in preference for complex projects that could be less suitable or complicated in the long term.

In the context of the Zambezi River Basin, the Zambezi and not Kafue was the most known river in the west. Its history, powerful torrents, and the Victoria Falls had perplexed most of the western geographers and travellers alike. Dr. David Livingstone, whose Zambezi expedition failed in 1858 to conquer the lower situated Cahora Bassa rapids (Middlemas 1975), as a pioneer, did a remarkable job to bring awareness of the river to the British. Taming such a troublesome river would have therefore been an engineering marvel. If there was a project that would prove challenging, exciting and name-making, the Kariba was it and not the Kafue (McGregor 2009). The Kariba Dam project also afforded the possibility to create the largest man-made lake in the world. This was the project that would clearly demonstrate the superiority of European science and engineering over the power of the mythical river gods worshipped by the riverine African communities (see also Hughes 2006). For such reasons, it would have been easy to raise excitement among potential investors with the Kariba as the main project. Most of the experts hired to conduct the technical evaluations on the Kafue and Kariba were also inclined towards the latter while disfavouring the former on the pretext of scanty information on the Kafue River (Clements 1960). Even though the proposed Kafue Hydropower project on the Kafue Gorge in Zambia was initially cheaper and more suitable, as the proposed power project was to supply bulk electricity to the copper belt in Zambia, preference by the Federal Government and investors was given to the Kariba project on the main Zambezi River (Burdette 1988).

3.5 African Nationalism and the Federation of Rhodesia and Nyasaland

An exploration of the underlying factors that led to the development of the Kariba hydro-electric power (HEP) project as opposed to the Kafue HEP project, also requires, as indicated above, a critical examination of the period during which these projects were proposed. An understanding of the relevance of this period is central to the understanding of the Kariba-Kafue dynamics and their consequences as evidenced in the present day water architecture in the Zambezi River Basin and Southern Africa as a whole.

The decision to prioritise the Kariba project was not just about the relative ease of raising financial capital for the project. Keeping in mind the fact that hydropower projects are just as political as they are hydrological, sociological issues should necessitate the review of the political environment in which the proposed HEP projects were initiated on the Zambezi River. Through such a review, it is possible to demonstrate that the changing political landscape in Africa had a significant influence on this very important decision. The emergence of African nationalism and pan-Africanism irrefutably contributed to the politics surrounding the choice between the Kariba and Kafue HEP projects (see Indiana University Press 1955).

In the post-Second World War period, there were growing calls among Africans to obtain independence from colonial rule (see Doxey 1975). The political connection between the elite Africans, especially the educated elite in diaspora, Africans from the Caribbean, and African Americans in the United States resulted in the establishment of the pan-African movement. At the same time, the British viewed the unification of the colonies in the form of the Federation of Rhodesia and Nyasaland in British Central Africa as a necessary platform to spearhead development in the colonies. In the political context of the 1950s, this idea was unpopular among the Africans in Nyasaland and Northern Rhodesia. Supporters of the Federation in contrast viewed the unification of the territories as key to attracting private investments, particularly American investments (Hance 1954). This was critical at the beginning of the 1950s when the Colonial Development Corporation (CDC) also shifted its focus to Public-Private investment portfolios as a way of financing potential projects, which from 1952 became a requirement for funding potential projects (Wicker 1955-56). The Corporation was interested in those projects whose earnings were sufficient to cover both interests and capital repayments (Wicker 1955-56). This implies that projects that also generated significant interest from the private investors (like the Kariba HEP project) were potential projects for financing under the CDC.

Proponents of the Federation also argued that the likelihood to attain resource use efficiency was high within the Federation, in addition to the high potential of increasing private investments due to risk dispersion. The Zambezi River, in the minds of those who supported the Federation, presented important opportunities for multi-purpose river development for instance through joint planning and execution of projects as a single unit (Hance 1954). Furthermore, it was expected that the Federation would facilitate joint planning of other important projects such as transport facilities, especially in the case of Northern Rhodesia whose bulk of the copper was transported through Southern Rhodesia to the port of Beira in Mozambique. The idea was that by operating as one administrative territory, it was possible to explore other more efficient routes to the coast i.e. through Nyasaland (see Hance 1954). Most importantly, the various potential hydropower sites in the Rhodesias and Nyasaland and the need to develop them also gave credence to the formation of the Federation. Available literature confirms that the formation of Rhodesia and Nyasaland facilitated plans for major waterworks in the region, as planning became centralised and hence reduced the need for colonial representations (Chenje 2003).

The African nationalists were nevertheless disinterested in the Federation because of its political implications. The nationalists expected the colonial governments to hand over power and not consolidate it through another colonial political structure. As the opposition grew intense among the Africans, some analysts suggested that the institution of the Federation should be postponed for a period of time until the majority of the Africans supported it. However, proponents of the Federation such as Major McKee, commissioner in Northern Rhodesia, argued that there was no need to waste more time not only because of the economic consequences of such a choice but because it was also political suicide for the administrators to allow African views dictate the fate of the Federation. African opposition to the Federation, according to some proponents of the Federation, was the work of a minority who were inciting racial emotions to garner support (McKee 1952). Allowing the Africans to dictate the outcome of the Federation would suggest the loss of constitutional power to the settlers since there was no guarantee that such actions would stop with the relinquishing of the idea of the Federation (McKee 1952).

The three territories in British Central Africa were asymmetrical both in their economic and political relations. Southern Rhodesia was the industrial power-house while Nyasaland both supplied raw materials such as cotton and migrant labour and consumed industrial products from Southern Rhodesia. Northern Rhodesia, despite being an important copper producer, consumed coal and manufactured products from Southern Rhodesia's industrial activities (Hance 1954). The proposed Federation of Rhodesia and Nyasaland was therefore seen as a tactic by the administrators in Southern Rhodesia to maintain the status quo, and this was partly the reason why some colonial administrators and other settlers in the territories north of the Zambezi River were sceptical of the Federation (see also Soils Incorporated (Pty) Ltd et al. 2000). Hance argues that in the absence of the copper belt, Southern Rhodesia would probably have not supported the Federation (Hance 1954). The copper industry at its peak improved the creditworthiness of the Federation.

Most of the colonial administrations were generally in favour of instituting the Federation of Rhodesia and Nyasaland, and any delays to do so were considered undesirable. According to General McKee, abandoning the Federation or merely suspending it would have implications for projects already in the pipeline (notably the Kariba and Kafue projects) and that administration planning in the territories would be affected as that would paralyse planning efforts (McKee 1952). Furthermore, in McKee's view, the flow of capital investment was unlikely if government control would be transferred to African majority rule since the African leaders were regarded as "immature and inexperienced" (McKee 1952: 332). The decision to institute the Federation therefore did not need to consider the African views. This made Africans in these territories "bitterly opposed" to the Federation (see Mason 1962: 25; Pike 1968: 118; Hutcheson 1966; Power 1998).

It was within this political context that the debate between the proposed Kafue and Kariba Hydropower projects took place. The question of which project to choose was therefore not only centred on economic feasibilities and geographical limitations. The political environment had to be factored in since investments in hydropower are long-term and have long repayment periods. The need to have a stable platform for attracting investors such as the Federation on one hand, and the growing dissenting views by the Africans on the other hand made the politics surrounding the two projects very complex. In the Kariba/Kafue context, this political environment played in favour of the Kariba project considering that an active nationalist movement creates a potential for a dispute in international river basins (see Wolf et al. 2003).

3.6 Geographical considerations: Contiguous vs successive river configurations

The hydro-politics of the 1950s also allow us to analyse how the geography of the basin influences international water resources development. In the political turmoil of the 1950s and 1960s, the centrality of geography played a key role in the choice of the Kariba HEP project. With the Kafue being solely located in Northern Rhodesia, if it was developed and the territory granted independence, Southern Rhodesia would have had limited influence on the management of the project, as well as what Zambia could or could not do with regards to Southern Rhodesia's political affairs. On the other hand, the proposed Kariba HEP project was on the contiguous part of the Zambezi River such that even with Zambia's independence, the newly independent state would have had limited powers to handle matters on the Kariba unilaterally. This is also in line with observations involving contiguous rivers where the likelihood of one riparian state to cause harm to another state is limited by the ability of the other state to reciprocate (see Toset et al. 2000). This suggests that Northern Rhodesia, once granted independence, would not have been able to cause harm to Southern Rhodesia without causing harm to itself. Nevertheless, the decision to locate the powerhouse on the southern bank of the river placed more powers in the hands of the Southern Rhodesia Government. Thus the execution of the project aimed to secure the rights of the hegemonic state.

The decision to develop the Kariba project instead of the Kafue represented a significant contribution to nationalist policies in international water resources management in the Zambezi River Basin. The whole idea of implementing the Kariba in the mode in which it was implemented was to secure maximum benefits for one of the parties and at worst to use it as tool to manipulate the other. As Tvedt has observed, not only are dams symbols of power, but such large-scale water projects may also be used to subjugate others (Tvedt 2015). Predicting that Northern Rhodesia would soon become independent, the project could be used to moderate opposition from the northern neighbour.

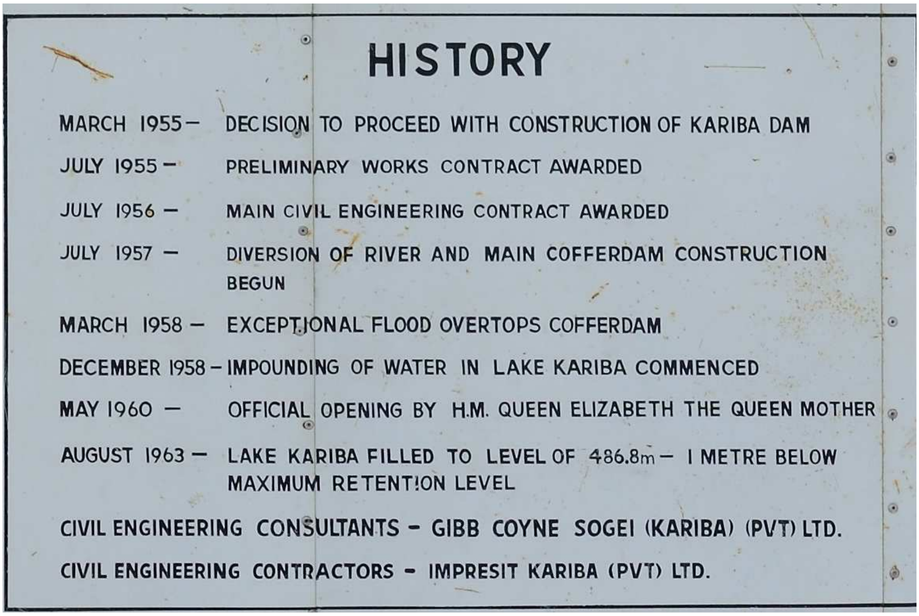

Figure 5. A summary table of the history of the Kariba dam
(Information plate at the Kariba dam)

3.7 The Kariba HEP project and political developments in the basin

Well documented is the fact that the Kariba Hydro-electric dam was constructed mostly for economic reasons (Hughes 2006; Soils Incorporated (Pty) Ltd et al. 2000). The need for cheap and reliable energy to meet the demand for energy in Southern Rhodesia's manufacturing sector and mining in Northern Rhodesia has been well documented and were argued as reasons for constructing such a gigantic project.

Kariba Dam made history in that reservoir formed behind the dam became what was the largest man-made lake. To put it into context, India with its vast hydro-engineering works, the total storage capacity in dams was still below the volume of water storage at Kariba at the turn of the century (Baijal & Singh 2000). This attests to an engineering marvel that Kariba was, a true symbol of human ingenuity in taming nature (see Hughes 2006). For the government in Southern Rhodesia particularly, the autonomous nature of its administration coupled with rapid industrial growth, the dam symbolized its mark in this part of Africa with a new modern look of Africa. The execution of the Kariba HEP project however had other important implications that cemented nationalistic attitudes towards international water management. Its execution combined with the institutionalisation of the Federation of Rhodesia and Nyasaland played a pivotal role for the nationalist movements and vice versa. Initially, liberation movements within the countries were fragmented and operated independently of each other. This was not strange because the formation of states as a result of the partition of Africa did not necessarily bring different tribes together. They continued in an ad hoc manner shaping their unique relationships with the colonial governments. The birth of mining towns as well as cities however allowed these different groups to have shared experiences, an important ingredient in building a national conscience. So in part, colonialism provided political unity among people who previously lacked such unity (Mason 1962). Nonetheless, it is important to note that the African movements were initiated with the aim of improving the conditions of the African workers and not necessarily as a mechanism for demanding African independence. Normally such movements were initiated by civil servants, mine workers, and teachers who wanted to improve their working conditions (Hedges 1989).[15]

The educated elites who also pioneered the national movements faced a stumbling block arising from ethnic divisions and diverse geographies. As Mazrui argues, the rise of African nationalism was grounded in race consciousness (Mazrui 1982). In this sense, dams played a pivotal role in various ways. On one front, the construction of

[15] David Hedges writing on the birth of the Nyasaland African Congress (Hedges 1989)

large-scale dams alone at this particular time was a statement of intent to sustain colonialism. This notion was made worse by the insistence on instituting the Federation of Rhodesia and Nyasaland as a viable platform for securing major capital investments. Portugal on the other hand was up front with its intentions in the case of Cahora Bassa, and that was to remain in Mozambique forever. However, even in the case of the Kariba where such intentions were not explicit, it is not hard to deduce that these intentions were present. Large-scale dams are complex and require huge capital investments. The colonial governments would not be willing to carry out such projects if they did not intend to utilise them, meaning that they had to maintain control of these territories. On the other front, long periods of servicing debts could only make sense if these governments were still in control. After all, none of the Africans in sub-Sahara Africa had been in control of governments based on the western model of government administration. Furthermore, some of the worst social implications of large dams, particularly regarding relocation of communities, were borne by the local Africans and the nationalist leaders capitalised on this. Taking for instance the case of Southern Rhodesia, the government declared the area around the Lake Kariba a national park thereby hindering any possible settlement there for the displaced Africans (see Soils Incorporated (Pty) Ltd et al. 2000; Kaluba and Mukupe 2000). This meant that any possible use of the reservoir drawdown to mitigate the loss of overbank flooding was inaccessible to the displaced communities, some of whom were relocated to areas close to 200 km away from the river bank. The living conditions of the relocated communities as such generally dwindled rapidly in the new locations (McGregor 2009; Scudder 2005; see also Mukono & Mulendema 2000). The social implications of these projects therefore helped to build their nationalist agenda of the nationalist leaders.

The factors that complicated the hydro-politics surrounding the Kariba Project, as previously stated, mainly involved the timing of the project. Had it been proposed and constructed before the Second World War, the outlook of the project would have been different. However, before the war, there was little justification to develop such a grand project. So while there were economic justifications for large hydropower development in British Central Africa after the war, the changing political situation in the region made these decisions overly complex. One can argue that the rise of African nationalism possibly contributed to the decision to develop the Kariba HEP project rather than the Kafue HEP project. However, it is also clear that nationalist movements took advantage of these projects to pave their way and stimulate racial consciousness among the people's anti-colonial stance. Such being the case, the economic potential of the project took a secondary position and instead the focus was directed on the political dimensions of the dam. In such political considerations, the choice of the Kariba HEP did not provide a stable platform for the immediate post-colonial international cooperation on water resources management. In fact, all it managed was to accomplish the opposite. Notably, the first casualty of the changing political configuration in the basin was the Federation itself, which had been marketed as a viable platform for sustained economic development. Following the granting of self-governance in Malawi in 1963, the Federation was dissolved, with some of the Federal projects becoming national entities, particularly in Malawi (see Tumbare & Mukosa 2000; Kampanje-Phiri 2010). Consequentially, the Federal Hydro-electric Power Board became incompatible with the new political reality and instead the Central Africa Power Corporation (CAPCO) was instituted by the Governments of Northern and Southern Rhodesia to continue managing and supplying power to the two states (Tumbare & Mukosa 2000; see also Soils Incorporated (Pty) Ltd et al. 2000).

Photo 1. The Kariba dam wall viewed for the South Bank of the Zambezi River

Photo 2. The Kariba Dam wall viewed from the north bank of the Zambezi River

3.8 Nationalism, pan-Africanism and the development of the Cahora Bassa hydro-electric power project

As more African countries gained independence by the beginning of the 1960s, the tide of African nationalism began to be felt strongly by the colonial governments in Southern Africa. In Nyasaland, general elections were held in 1961 where the Malawi Congress Party won with an overwhelming majority followed by the granting of self-governance and total independence in 1963 and 1964 respectively. By 1963, Tanganyika gained independence and this among others necessitated drastic changes among the minority governments in Southern Africa.

The rapidly changing political scene in Southern Africa placed South Africa, the region's hegemonic state, in an awkward position. The isolationism policy preferred by the South African Government could no longer be sustained under the rise of African Nationalism and with many of the African states being granted independence (Davidson 1974). Under Prime Minister Verwoerd and later Vorster and the Afrikaner National Party, the South Africa Government decided to embrace a new foreign policy strategy which was termed the "outward-looking policy". Under the outward-looking foreign policy, South Africa intended to build peaceful relations with other African states through aid, stronger economic ties etc (Cefkin 1973: 31; Davidson 1974: 9). Ideal relations with Africa from the South African perspective involved having regional neighbours that were friendly at best and neutral at worst (see Middlemas 1975). South Africa's strategy for peace in Southern Africa and for its own sustenance also preferred independent African states as neighbours but rather in a weak state and totally divided (see Geshekter 1975). Moreover, the South African Government also aimed to maintain South Africa as a manufacturing/industrial hub and the rest of the regional states as both suppliers of raw materials and consumers of South African made goods (Geshekter 1975; see Davidson 1974).

By the time both Northern Rhodesia (renamed to Zambia) and Nyasaland (Malawi) became independent states in 1964, South Africa was in the process of adopting its new foreign policy stance. Malawi and Zambia, as independent states, became automatically geopolitically frontline states since they formed the southernmost frontier of the independent Africa and the white south. The insistence to maintain white minority rule by the Southern Rhodesian Government, the Portuguese in Mozambique and Angola, and the South African Government in Namibia complicated foreign policy formulations of the new independent states.

Despite successful decolonisation, political freedom from Britain did not wean the new African states from their dependency on the white governed economies in the south, particularly that of South Africa. South Africa was not just any other sub-Saharan African country. Its economy was significant as its Gross National Product (GNP) constituted a third of the African GNP (Cefkin 1973). Malawi as a new independent state just like Zambia found itself in an awkward position. Southern Rhodesia and South Africa were important markets for Malawi's imports and exports while its import and export corridors were through Mozambique, still under Portuguese rule (Wills 1985). The situation was no different for Zambia. During Zambia's first year of independence, all Zambia's coal came from Southern Rhodesia, its oil supplied by the pipeline through Southern Rhodesia and the bulk of its electricity, around 70 per cent came from the Kariba Dam (Deroche 2008; Williams 1984).

These strong imperial connections signified the power asymmetries in Southern Africa, and the ability of the colonial governments to blackmail the new states if they were to become overly nationalistic and pan-Africanist. On the other hand, the leaders of the frontline states were expected to support the liberation struggles of their fellow Africans still under colonial rule. This was important as a show of solidarity since decolonisation had become one of the highest priorities of the Organization of African Unity (OAU) in the 1960s (Cefkin 1973). Yet the urgent need to overcome the biggest threat to state failure was to achieve economic development for the masses so as to dwarf the challenges arising from ethnic division as well as political and ideological differences (Cefkin 1973). This is where economic cooperation with South Africa was critical. However, for many of the stringent nationalist leaders, independence from the imperial powers was understood as a necessary precondition for the development of the African people (Cefkin 1973).

As a consequence of the imperial setup, most of the Southern African countries were intrinsically linked politically as well as economically (see also SADCC 1980). Attempting to cut off such connections abruptly would be extremely costly to the new states (Cefkin 1973). Moreover, without stable economies, the legitimacy of the new leaders would be questionable. The relationship of the states in the Zambezi River Basin with South Africa was therefore paradoxical. Politically, the independent states were against the racial practices of the apartheid government. Yet economically, their economic wellbeing depended on the South African economy. Balancing the two conflicting positions was complex. Moreover, other independent African nations including freedom fighters in the remaining colonies expected these independent states to advance their fight for independence. In the case of Malawi, the young radicalised politicians wanted to align themselves with the OAU stance on the colonial governments. This stance brought them into confrontation with the President of Malawi who had a different opinion. This is one of the reasons why the Malawi cabinet crisis of 1964 occurred, soon after independence (see Kaunda 1995). As in the case of Zambia, other politicians, particularly from the opposition parties, argued that the Zambian President was sacrificing a lot for other people's independence.

The leadership in Zambia, due to the humanistic ideals of President Kaunda, actively championed the liberation of the other African states still under white minority rule at a cost to Zambia's own economic development (Loxley 1990). This was contrary to the foreign policy that the Malawian leadership pursued by prioritising economic development (Cefkin 1973). Here however, geography and the copper industry in Zambia allowed the Zambians to follow that course since they were in relatively better shape economically than Malawi at the time of independence. Despite the costly decisions made by the Zambian leadership, Zambia still managed to register annual growth of 18.6 per cent between the years 1967 to 1971, which was three times the annual growth of Malawi's GNP, averaging around 6 per cent (Cefkin 1973). The Malawi president opted to cooperate with the colonial governments arguing that the country's geography and history made it impossible to progress otherwise (McMaster 1974). This was in contravention of OAU's resolution which called for sanctions on the colonial governments in Southern Africa (see Doxey 1975). However, by cooperating with the colonial administrations, Malawi complicated relations with other African nationalists. Some scholars and politicians argued that Malawi was not forced to cooperate with the imperial powers since there was always an option of neutrality if geography did not allow complete isolation (see Mayall 1973).

Some historians have also argued that Malawi failed to explore other economic corridors to gain access to the international markets in order to be less dependent on the colonial governments. For instance, these scholars have argued that Malawi failed to shape positive working relationships with Tanzania because of Tanzania's grant of refuge to Banda's opponents in Malawi (Cefkin 1973; see also Mayall 1973). Moreover, Malawi also differed with Tanzania in economic principles. The Tanzanian leadership adopted socialism which discouraged injection of foreign capital into their economy (see Middlemas 1975) contrary to Banda's economic principles, where foreign direct investments (FDIs) from the west were welcomed as a means to achieving high levels of industrialisation. For President Banda, all countries that were willing to invest in Malawi were highly valued apart from those that took a communist stand. These political and economic differences made it difficult for the two countries to work closely together.

The close cooperation between the government of Malawi and the colonial governments in Southern Africa also made the Tanzanian leadership uneasy in relation to the government of Malawi. Equally, the granting of refuge to Banda's opponents was also problematic for President Banda of Malawi (see Mayall 1973). Lake Malawi subsequently became a potential area of conflict. Mayall suggests that political differences are what might have elevated the lake boundary dispute between the two states because of the implications in the liberation struggle in Mozambique (Mayall 1973). As South Africa pursued FRELIMO liberation fighters in Mozambique, Tanzania was becoming weary of South Africa because of Tanzania's assistance to FRELIMO. Tanzania insinuated that the South African Government and the Portuguese would attack the country through Lake Malawi (see Mayall 1973). Such assertions also justified the shifting of the border to the median of the lake, a call that was rejected by the Malawi president. When media reports surfaced that President Nyerere of Tanzania had made territorial claims on some parts of Lake Malawi, President Banda in 1967 argued that of all the nations in this part of Africa, Malawi was the only country with legitimate territorial claims on other nations and not vice versa[16] (Daily Times, 7 August 2012: 9).

Malawi's close cooperation with the colonial governments was also based on other geopolitical reasons. The initial liberation movements in Mozambique, as in the rest of the Zambezi Basin States, were fragmented due to cultural complexities and ethnic diversities. Some of the liberation leaders advanced the idea that the ethnic groups in Mozambique should align themselves with other similar groups in the neighbouring countries to become part of those states (Middlemas 1975). Kamuzu Banda as such engaged the liberation movements around Tete not with the aim of supporting the nationalist movement in Mozambique but as a possibility of annexing part of the Tete area as a territory of Malawi. Furthermore, the Portuguese in Mozambique entertained the idea of partitioning the north-eastern part of Mozambique to Malawi in order to restrict the movement of FRELIMO fighters from Tanzania. The Banda-

[16]The Daily Times of 7 August 2012 citing the Times newspaper dated 29 June 1967

Portuguese/Salazar discussions between 1961 and 1963 therefore also touched on this very subject (Hedges 1989).

In the case of Zambia, the unilateral declaration of independence (UDI) by the Smith Government in Southern Rhodesia in 1965 was problematic for the Zambian leaders and the relations between the two countries (see Doxey 1975; Soils Incorporated (Pty) Ltd et al. 2000). With Kaunda's humanistic style of leadership, relations between an independent Zambia and the Smith Government in Southern Rhodesia were unlikely to be cordial. Dependency upon Southern Rhodesia for energy as well as other important supplies was therefore not only economic but also political suicide for the Zambian Government. This evidently became a real threat when the borders between the two states were closed in 1973. Yet, the Central Africa Power Company continued to operate normally and the employees of the institution continued to operate on both sides of the border despite it being closed (Mukosa 2000). Nevertheless, the Zambian leadership at this juncture was not seeking ways to improve relations with the colonial governments but at a total disengagement from the white south (see Burdette 1988). Such being the case, the Zambian Government was determined to wean Zambia from its dependence on foreign powers for energy, as relations worsened with the Smith Government (see Mihalyi 1977; Scudder 2000). This position did not however change the relevance of the Kariba Dam as a major entity that linked Zambia and Southern Rhodesia together, an undertaking that would never have been accomplished had it been proposed after Zambia's independence (Austin 1968).

The Unilateral Declaration of Independence by the Smith Government was also problematic for South Africa's own outward-looking foreign policy. The South African Government viewed the UDI as a catalyst for an incensed African liberation struggle, a political force that South Africa did not want to confront near its borders. For South Africa, peace and stability in the neighbouring countries was of prime importance even if it meant having an African-led government, as long as the environment was conducive enough to allow growth in the region and of course its own sustenance (see Davidson 1974). The UDI was also challenging economically to South Africa since the government there sought to increase its stakes in Zambia by strengthening economic ties with the country (see Middlemas 1975).

The turbulent relations between Zambia and Southern Rhodesia after the UDI consequentially accelerated the pace of energy developments in Zambia. The development of the Kariba North Bank Power project was pushed bank to 1971 as a result of these difficult political relations (Soils Incorporated (Pty) Ltd et al. 2000). This probably might not have been the case had it been that the south was another frontline state. The Zambian administration focused on exploiting internal resources for power production. Pursuing the Kafue project, the administration benefited from preliminary studies that had already been conducted on both the Kafue and Kariba North Station power projects. Within a decade after gaining independence, two significant hydropower projects were carried out in Zambia cementing the national, energy-self-sufficient approach that became dominant in the Zambezi River Basin. A 600MW Kafue Gorge Hydropower station was constructed between 1971 and 1973 and 600MW Kariba North power station was completed in 1977 with support from the World Bank and other western governments (Mihalyi 1977; ECA 2009; Scudder 2000).

The development of the HEP projects in Zambia was not undertaken with regional needs in mind but rather to make Zambia energy-self-sufficient and have political autonomy. Zambia was of course experiencing an increasing demand for electricity from the 1950s, especially in the copper belt between 1964 and 1974 (Scudder 2005). The demand for electricity in Zambia increased at an annual rate of eight per cent in the first two decades after obtaining independence, with only about 16 per cent of households connected to the power grid (Mihalyi 1977). Nevertheless, these factors alone would not have necessitated the rapid development of the two grand energy projects in the country if it was not for the turbulent political relations with the Rhodesian Government. By the time the new projects were commissioned, the demand for electricity had declined both in Zambia and Southern Rhodesia with the falling copper prices affecting demand in Zambia and the liberation struggle in Southern Rhodesia affecting economic growth in both Southern Rhodesia and Zambia (Williams 1984).

The analysis of the decision by the government of Zambia to wean itself from Southern Rhodesia in energy supplies must however not lose sight of the relevance of the hydro-geography of the basin. Zambia's important tributaries, the Kafue and Luangwa Rivers, are solely located in Zambia, affording the state with the total physical control of the tributaries. This geographic reality allowed Zambia to pursue easily a policy of national energy self-sufficiency. This also means that any further developments on the main channel of the Zambezi were unlikely because that depended on the mutual agreement of the two states. If the position had been reversed, and that Zambia was Zimbabwe, it would have been impossible to pursue a policy of energy self-sufficiency by developing water resources since Zimbabwe is significantly limited in that regard as all its hydropower potential is shared with Zambia (see Chenje 2000).

As Zambia's economy started to take a hit during the end of the 1970s owing to falling copper prices and increased costs of transporting copper by air (see Loxley 1990), Kenneth Kaunda attempted to solve the situation by increasingly nationalising commercial entities. This strategy obviously went against the ideals of capitalist beliefs and subsequently drove investors away from the Zambian economy (Burdette 1988). The energy demand also rapidly declined owing to a combination of these factors (Scudder 2000). In addition, dissatisfaction from opposition parties continued to rise and Kenneth Kaunda took upon himself the role of leading opposition to Cahora Bassa as one way of changing the discourse in Zambia (Middlemas 1975).

If the timing of the Kariba HEP Project was problematic, then the timing of the Cahora Bassa HEP Project was completely out of touch with political reality in Southern Africa. By the time the Portuguese began to get serious about the Cahora Bassa project, most of the former colonial masters like the French and the British had accepted that colonialism in Africa was no longer relevant. The Portuguese, however, were not to be outdone by the British. The Kariba HEP project was a constant reminder of British ingenuity in Central Africa and, by comparison, Portugal had nothing significant to show for its over four hundred years of colonial history in Mozambique.

Cahora Bassa is a double curvature dam with a height of 171 m. It is 303m long at the crown with a minimum thickness of 5 m, while it has a maximum of 21.5 m at the foundations of the dam. The dam has eight bottom outlets and one surface flood spillway with a maximum discharge capacity of 14,000 m^3/s. The reservoir behind the Cahora Bassa measures 270 km in length and 30 km in width at maximum retention covering, a total surface area of 2900 km^2[17].

[17] Technical characteristics of the reservoir and the dam. Source: Hidroélectrica de Cahora Bassa webpage

Photo 3. The Cahora Bassa Dam in Mozambique
(coolgeography.co.uk)

Most probably encouraged by the British development plans for the Zambezi presented at the 1950 technical conference held in Victoria Falls (Middlemas 1975), the Portuguese advanced their development plans for the Zambezi Valley. The plans to develop the Zambezi valley, including the Cahora Bassa project, were initiated as early as 1953. In line with the Portuguese development philosophy for the valley, the initial plans were indeed ambitious and encompassed various facets of development (Middlemas 1975). However, Portugal was weak economically, as were its colonies – the Portuguese administration, marred by administrative bureaucracy, prohibited mineral exploitation of copper, iron and coal found in the Tete area, which in turn restricted economic opportunities (Geshekter 1975). This limited the financial muscle of Portugal and its colony Mozambique, and rendered grand projects such as the Cahora Bassa unrealistic.

As plans to develop the Zambezi Valley progressed, they were moderated to a more realistic level given the financial situation of Portugal. A general plan for a hydropower project was submitted to the Portuguese Government in 1966 followed by a tendering process to develop this plan in 1967-68 (Radmann 1974). Unlike the proposed Cahora Bassa project, there was at least economic justification for the Kariba Project. Power demand existed in both the two colonies, Northern Rhodesia and Southern Rhodesia. Power demand in Southern Rhodesia alone soared by up to 16 per cent annually between the years 1946 and 1954, whereby the mean expected growth for the Federation of Rhodesia and Nyasaland was nine per cent (Barkved 1996). The initiation of the Kariba HEP project also spurred further developments in Zambia and Southern Rhodesia such as the establishment of the fertilizer industry in Zimbabwe and increased copper production in Zambia, generating 80 per cent of the country's foreign exchange between the mid-1960s and the end of the 1980s (Scudder 2005).

No internal power demand however existed for Cahora Bassa – a grand scheme worthy of rivalling major hydropower dams around the world – when it was conceptualised. The estimated internal demand for electricity in Mozambique was around five to ten per cent of the planned installed capacity of Cahora Bassa at the time the project was proposed (see Isaacman & Isaacman 2013). Even long-term projections provided no economic justification for such an ambitious project (Middlemas 1975). The estimated total cost of the project was 517.5 million US Dollars, with the government of South Africa contributing as much as 96.5 million US Dollars in total (Radmann 1974). Even though Cahora Bassa's projected power output rivalled the greatest in the world, such as the Churchill Falls Dam in Canada, its estimated cost per output power was relatively much lower compared to other projects in Africa. The cost for the Aswan High Dam in Egypt for instance was approximately over 1,000 million US Dollars (Radmann 1974).

For Portugal, Cahora Bassa was not just an economic and developmental project. It was an expression of the nation's commitment to stay in Mozambique and to maintain Portugal's firm hold of Mozambique (Middlemas 1975). The colonies provided very strong foundations for Portugal's stronger political power among the European nations (Davidson 1974). It is perhaps no surprise that the defence budget of Portugal continued to rise to as high as 459 million US Dollars in 1972 as the war efforts to curb opposition in the colonies intensified (Davidson 1974).

Portugal was the poorest nation of all the European imperial powers in Africa (Middlemas 1975; World Council of Churches 1971). Nevertheless, under Salazar's dictatorship, the Portuguese economy did manage to stabilise. The desire to implement an ambitious project in Mozambique was therefore paradoxical for the Portuguese leadership. Mozambique on its own was not creditworthy to secure the capital required for such a project, and yet Portugal was also unwilling in many ways to ruin its creditworthiness by guaranteeing such a project (Middlemas 1975). For the Portuguese planners, the ingenious way to implement Cahora Bassa without burdening Portugal with debt was to find a customer large enough within the region who could venture into a power-purchasing agreement to buy bulk electricity (Middlemas 1975).

Zambia and Malawi, while being potential customers, were not large enough to offset the cost of, let alone, justify the development of Cahora Bassa. After all, Zambia with its turbulent relations with Southern Rhodesia could not prioritise an outside energy source. Both Southern Rhodesia and South Africa on the other hand had vibrant economic undertakings. The only problem with Southern Rhodesia was that it was under UN sanctions as the result of the UDI and such a grand project could not be based on an economy whose future was questionable. To the Portuguese leaders, South Africa remained the only customer large enough to purchase power at a price that would offset the cost of Cahora Bassa in the long term. In order to convince the sceptical public in Portugal that the project would not be a burden on Portugal, the project proponents needed to demonstrate the capability of the project to pay for itself through power purchasing agreements.

While South Africa's keen participation provided economic justification for the project, Malawi's willingness to purchase power from Cahora Bassa, though of no economic significance, provided the much needed moral justification for the project. As resistance to the project intensified in various quarters due to its colonialist connotations (see World Council of Churches 1971), Dr. Kiesinger of the Christian Democratic government in Germany justified the project by highlighting its importance to Malawi, one of the poorest countries in the world (Middlemas 1975). The same stance was taken by the UN Economic Committee in 1969 in its recommendation of Cahora Bassa (Middlemas 1975: 174). Nonetheless, opposition to the dam due to its colonialist undertones was so popular among University students in the west that when Consorcio Hidroeléctrico de Zambeze (ZAMCO) won the contract to build the dam, one of the companies in the consortium, ASEA from Sweden, was forced to withdraw from the project (Middlemas 1975).

South Africa, through its participation in the Cahora Bassa project, became an integral part of the Zambezi River Basin. For South Africa too, this project was also more than just an economic and developmental project. It was outright political as it was economic and developmental. With Portugal still in Mozambique and Angola, the political frontier between South Africa and most of the independent African states, especially those that were critical of its regime, would be maintained in the north of the Zambezi River (see Cefkin 1973; Middlemas 1975; World Council of Churches 1971). This was critical for South Africa since the existence of the buffer states limited the likelihood of any cross-border attacks by South Africa's own opposition groups from neighbouring countries. Of course there were other interests too, such as mineral concessions in both Angola and Mozambique, which were also economically important for the rapidly developing industrial sector in South Africa (see Davidson 1974). The 1970 agreement on the exploitation of 'mineral and radio-active deposits' in Tete between Portugal and Companhia Moçambicana de Minas SARL (Comocmin), a subsidiary of the Johannesburg Consolidated Investments, is a good example of related projects to the Cahora Bassa project in the region (World Council of Churches 1971: 23; see also Davidson 1974: 11).

It should also be noted that there was no economic justification for South Africa to participate in the Cahora Bassa project when it was proposed. Nonetheless, political considerations by the South African Government outweighed economic ones. That is the reason why the electricity supply commission (Eskom), an entity that was supposed to be at the centre of this project, was unwilling to commit itself to the amount of bulk electricity that Portugal required South Africa to buy (Middlemas 1975). The first phase of the Cahora Bassa power plant was expected to produce 1224 MW of electricity by 1975, with a further addition of 816 MW by 1979. An additional 2000 MW of electricity was planned for commissioning by the 1990s from the development of the north-bank power house, bringing the total of installed power at Cahora Bassa to over 4000 MW (see World Council of Churches 1971). Eskom South Africa, as the main consumer of electricity generated at Cahora Bassa, was expected to purchase a minimum of 680 MW of electricity in 1975, and raising it to 1070 MW from 1977 with further increases to 1470 by 1981 (see World Council of Churches 1971).

The Portuguese government signed a 515 Million US Dollars contract with ZAMCO Limitada to build Cahora Bassa (Middlemas 1975). The consortium was composed of South African companies, comprised of Anglo-American Corporation, LTA, Shaft

Sinkers, Vector Projects and Construction, and Powerlines, a subsidiary of SAE; West Germany companies, which included Hochtief, Siemens, AEG Telefunken, J. M. Voith, and Brown, Boveri and CIE; French companies, which included Compagnie Générale d´Electricité (CGE), Alsthom, Compagnie de Construction Internationales (CCI), Neyrpic, Cogolex, and CGEE; an Italian company, Societa Anonima Electrificazione (SAE); and a Portuguese company, Sorefame SARL (see World Council of Churches 1971). Operating on a deadline of 1975, preliminary work for the construction of the dam started in 1969 (Middlemas 1975). The first phase of the project encompassed construction of the dam wall, installation of the powerhouse on the south bank with generators with a capacity of 408 MW each, and installation of high voltage cables including substations between Cahora Bassa and South Africa (World Council of Churches 1971). By January 1975, spillway gates were closed to allow the lake to fill up and testing of the first generator started in February of the same year (Middlemas 1975).

To many of the liberation fighters and nationalist's leaders, the execution of the Cahora Bassa Dam represented a grand coalition of the white South – that is South Africa, Southern Rhodesia and the Portuguese – in their bid to secure their minority governments and marginalise Africans (see Shore 1974; Middlemas 1975). Both the Portuguese in Africa and the apartheid government in South Africa were unpopular among the independent African states because of their racist practices. Moreover, the South African Government, besides participating in the hydro-electric power project, became actively involved in the internal affairs of Mozambique. During the dam's construction, the South African Government increased cross-border policing activities into Mozambique, in particular when FRELIMO fighters advanced southwards. In South Africa's view, an increasingly powerful FRELIMO force in Mozambique was a potential security threat to South Africa, as South African and Southern Rhodesia liberation movements would work much more closely with FRELIMO (FRELIMO 1970). Crushing FRELIMO resistance and halting its advancement south of the Zambezi was therefore an attempt to weaken the other liberation forces.

The project description of Cahora Bassa involved other important economic and social developments aiming to stimulate development in the Zambezi valley. Apart from hydro-electric power generation, the project aimed to enhance and expand irrigation activities, control floods, improve river navigation, increase mining activities due to sufficient electricity and others (see World Council of Churches 1971). Nevertheless, the biggest problem with the project was the lack of benefit for the Africans in Mozambique. According to the initial estimates, the construction of the dam necessitated the relocation of 25,000 Africans while at the same time providing the opportunity to resettle around 1 million European migrants in the valley (Radmann 1974; see also World Council of Churches 1971; FRELIMO 1970). The African nationalist leaders therefore perceived this as a means to strengthen European control over natural resources in the valley. FRELIMO fighters, in waging a resistance against the Portuguese administration, opted to continuously attack supply lines to the dam site and Malawi and not the dam itself (Middlemas 1975). This was probably undertaken to make the Portuguese lose the only black ally they had in the region but also possibly to deter potential immigrants from settling in the region.

The resistance to Cahora Bassa was therefore not necessarily about the economic significance of the dam to an independent Mozambique but rather about the intention of the project. The very idea of resettling around one million white immigrants in the Zambezi Basin was embraced by some Portuguese military officials as a feasible and strategic move to quell African resistance to Portuguese rule (FRELIMO 1970). A large reservoir behind the Cahora Bassa dam was also seen as a potential tool to prevent the smooth advancement of FRELIMO fighters southwards (Isaacman & Isaacman 2013). Cabora Bassa was therefore in many ways a reflection of Portugal's resolve and commitment to stay in Mozambique permanently (see Isaacman 2005). For FRELIMO leaders too, Cahora Bassa was a well-calculated attack on the people of Mozambique, Southern Africa and Africa in general (Isaacman 2005; World Council of Churches 1971) and was in simplest terms a Portuguese ploy to extend colonial rule in Mozambique. It is interesting that for the FRELIMO leaders, there was always a need to include the symbolism of the dam for the people of Africa in general since their support, like that of Kenneth Kaunda was paramount to their struggle for independence. This was an appeal to the consciousness of Africans in general to feel part of the Mozambican's struggle for independence.

The dam, in FRELIMO's view, was a political barrier to the Africans in Mozambique from becoming independent, and any African country that was willing to participate in this project was working against the will of Africans in Mozambique and on the continent in general. Furthermore, it would have been an act of betrayal to the spirit of pan-Africanism that most of the nationalist leaders in Africa embraced and highly respected. Pan-Africanism in many ways preceded national pride. As a consequence, interstate cooperation was significantly influenced by the political preferences as well as the ideological positions of the nationalist leaders (see Geshekter 1975). In this context, regional participation in the Cahora Bassa project would not be realistic despite its huge economic potential provided by power interconnection.

Once Mozambique became independent, the Cahora Bassa dam became an integral part of FRELIMO's socialist and ambitious plans to transform the lives of the people of Mozambique. Portugal remained the majority shareholder in the project with the government of Mozambique owning around 18 per cent of the project (Isaacman & Isaacman 2013). The fundamental role of the dam in the economic plans of an independent Mozambique is hardly surprising since resistance to the dam by FRELIMO was not rooted in the economic and developmental dimensions of the dam but rather in its political and social symbolism. Immediately after obtaining independence, the FRELIMO Government intended to construct the north bank power station and become operational by the end of the first decade (Isaacman 2005). To date, Cahora Bassa remains fundamental to the economic development plans for the country, particularly as a means to attract foreign capital and investments (Isaacman 2005).

In the immediate post-colonial Mozambique, the promise to have a fair and prosperous Mozambique was already at risk as some factions of the population were becoming discontent with the socialist agenda of the FRELIMO Government. Within the business environment, the coming to power of the FRELIMO Government after 400 years of Portuguese rule frightened some of the European investors, who did not want to be part of a socialist state and subsequently withdrew their capital (Geshekter 1975). The question of how to deal with South Africa also became contentious in Mozambique as the inherited economy was highly dependent on South Africa. At the dawn of Mozambique's independence, the South African Government expressed willingness to help an independent Mozambique, in line with Vorster's outward-looking policy. The idea of receiving economic assistance from South Africa was however controversial for the FRELIMO Government because of unwillingness by some members to work with the racist government, even though South Africa was still economically important at least in the immediate short term (Geshekter 1975).

Other scholars have argued that the rebel group Resisténcia Nacional Moçambicana (RENAMO) was formed partly from the growing disapproval of hard-line socialist policies implemented by the FRELIMO Government. Other scholars interpret RENAMO to be part of the Southern Rhodesian Government's disruptive policies which aimed to discourage the Mozambican Government from supporting liberation movements operating from that country i.e. the Zimbabwe African National Liberation Army (ZANLA). RENAMO also became a strategic arm of the South African Government under Botha for similar reasons, following the demise of the Smith Government in Southern Rhodesian (Huffman 1992).

The West turned a blind eye to the civil wars in the former Portuguese territories as rebel movements were associated with freedom fighters – those saving Mozambique as well as Angola from the grip of the Marxist-Lenin political-economic arrangement (see Huffman 1992). This anti-socialist stance was also used by Portugal in light of the Cahora Bassa to promote its noble duty on behalf of the west to halt socialism which was linked to the nationalist movements (see Middlemas 1975). However, the reality on the ground highlighted a different picture altogether, as Mondlane under his leadership tried to balance FRELIMO's relationship with both the west and east (Middlemas 1975). This showed that there was little chance that FRELIMO could be extremely left-wing.

The Zambezi River Basin became increasingly unstable and less attractive for major capital investments, including the water and energy sectors, as the second half of the twentieth century progressed. This was due to the disintegration of the region into war zones as a result of continued armed struggle for independence; partly internal divisions and partly the global ideological conflict between capitalism and Marxism. As Portugal left the African political scene and participation in the Cahora Bassa project was no longer politically immoral, the basin countries could not take a risk on power interconnections even though such projects were necessary for the efficient utilisation of water resources.

The development of new hydropower plants was affected since those sites that offered huge potential could not be developed solely for in country consumption. Moreover, Malawi, as the only independent state in the Zambezi River Basin which expressed interests to import power from Mozambique during the Portuguese rule, turned to the development of its internal hydropower potential for fear of reprisals from the FRELIMO Government. Tedzani I and II projects were commissioned on the Shire River in the 1970s to produce 40 MW of electricity, and supply was further increased in 1981 when Nkula Falls B station was commissioned on the same River, adding 100

MW of installed capacity.[18] Malawi was able to turn to the development of hydro-electric power projects within the country because hydropower potential exist in the country and in its case, no large dams were required, since Lake Malawi acts as a natural reservoir whose levels are controlled by a barrage on the Shire, constructed in 1965 (see Amer & Hutcheson 1966)

The emergence of Zimbabwe as an independent state in 1980 and the coming to power of Botha in the Republic of South Africa influenced some changes in the region. Zimbabwe's independence forced Botha's Government to depart from the South African outward-looking foreign policy that had been championed by Vorster. The fall of the Rhodesian Government and the pulling out of Portugal from Africa left South Africa with no buffer states. The South African Government consequentially adopted a destabilisation strategy, which caused significant economic damage particularly to Mozambique and Angola through support to such groups as RENAMO and the National Union for the Total Independence of Angola (UNITA) (Munslow & O'Keefe 1984).

The Zambezi River Basin countries (with the exception of Namibia) together with the states of Lesotho and Swaziland nevertheless strengthened their resolve to increase cooperation among themselves in order to lessen their dependence on South Africa and other countries outside the region. The Southern Africa Development Coordination Conference (SADCC) was therefore established in 1980, the very same year that Zimbabwe gained independence (Munslow & O'Keefe 1984).

Oil refineries, dams and hydropower projects were obvious targets for UNITA, the rebel group in Angola, and there were several attacks on such installations like those in 1981 and 1983 respectively (Munslow & O'Keefe 1984). Destabilisation activities in

[18] Source: Electricity Supply Commission of Malawi (ESCOM).

Mozambique, in particular attacks on oil refineries and transport infrastructure, also created fuel crises in Mozambique and Zimbabwe as well as affecting Malawi's import and export undertakings, since a huge percentage of these went through the port of Beira in Mozambique (Munslow & O'Keefe 1984). This development was not conducive to the fostering of regional ties and mutual interdependence. The situation was counterproductive as by 1980, the SADCC region had an oversupply of domestic energy to sustain development within the region (Simoes 1984). However, spatial, financial, and legal institutional barriers limited intraregional flow of those resources (Munslow & O'Keefe 1984).

By the beginning of the 1980s, the Southern Africa region generated surplus energy of approximately 67 per cent. Mozambique and Zimbabwe, while generating some electricity locally, also imported electricity. The power demand which had declined both in Zambia and Southern Rhodesia at the beginning of 1970s increased with the gaining of independence of Zimbabwe (Williams 1984). The roles of Zambia and Zimbabwe reversed in terms of power reliance with Zimbabwe importing electricity from Zambia as demand exceed generation as compared to the 1960s where the bulk of power for Zambia came from the Southern Rhodesia (Williams 1984). South Africa, however, imported most of the electricity generated in the region, exemplifying its economic importance in the region (Munslow & O'Keefe 1984). There was also a growing tendency by the SADCC region states to initiate power projects for national consumption, contributing to oversupply in the region. In other words, post-colonial states placed greater emphasis on their sovereign rights and national interests, which were counterproductive to establishing expedient water cooperative mechanisms (see Turton 2008). Mozambique on the other hand, with its excess production, was openly seeking potential clients for its power plant (Munslow & O'Keefe 1984).

There is no doubt that the national leaders of the independent states faced enormous challenges in developing robust national and foreign policies that aimed to catapult their countries forward. Balancing between pan-Africanism and economic development was highly complex. Economic vibrancy was necessary to hold the countries together despite internal rivalries caused by geography, ethnicity and ideological differences. This posed a real problem when dealing with South Africa. South Africa took advantage of this situation to ensure that some of the countries in the region took either a non-aligned position or at best had positive cooperative relations, like in the case of Malawi. Consequently, international relations between most of the basin states were shaky and rough. Turbulent foreign policy relations between the various states also limited international cooperation on use and exploitation of water resources among other things, despite the enormous potential that existed. Grand projects like that of the Cahora Bassa could as well have provided a key to the development of the region, including increased international cooperation. However, the politics surrounding it limited any economic potential of the project as it somehow polarised the region and increased direct involvement of South Africa which was a non-riparian state. Had it been that South Africa was not involved in the Cahora Bassa HEP project, the project would probably not have been so polarising.

3.9 Summary

Large hydropower plants in the Zambezi River Basin initiated in the colonial times have proved pivotal in international water management. While dams aimed to catapult the states forward in economic terms and a symbol of modernity, their initiation aimed to tilt the balance of power to either one group or one state over the other. Consequently, states in the basin pursued the development of water resources for national interests with limited regard for overall basin consequences or opportunities.

In consideration of geographical limits, difficult geopolitical relations and a rapidly changing political environment i.e. internalization of the basin, hydropower projects were designed to secure their ultimate control by one party or group of people. This approach limited basin-wide consideration of international development of water resources. The subsequent decolonisation process and adoption of counter-hegemonic strategies by the decolonised states encouraged nationalistic policies and strategies within water resources management. This nationalistic approach to development gave the government of South Africa an opportunity to intensify its destabilisation tactics as it aimed to reinforce its hegemony in the region. This polarised the basin as well as the regional states in terms of balancing pan-Africanism and the economic wellbeing of the states.

This chapter has also demonstrated that, other than for pure economic and developmental reasons, there were more dimensions to the dams that significantly influenced the shaping of the water architecture in the Zambezi River Basin. At certain points in time, dams were more political than economic or developmental and for this particular reason presented challenges to the fostering of international water cooperation. For political reasons and as a show of solidarity, the independent states refused to cooperate on a water project initiated by colonial powers even if there were potential economic gains. For these particular reasons, the Kariba Dam has remained the only hydropower project jointly undertaken by two or more states in the Zambezi River Basin.

It has also been revealed in this thesis that the hydro-geography of the basin facilitated hydropower developments in the states north of the Zambezi River, since this part of the basin has relatively good water availability and possesses hydropower potential. This implies that the approach to international water cooperation would have probably been different had it been that hydropower potential only existed on the Zambezi river main channel or that Zambia and Malawi were located south of the Zambezi River, with limited hydropower potential. But geography in these states, allowed the states to pursue easily the policies of energy self-sufficiency in order to gain more economic and political autonomy.

Chapter four

From a multinational to an international river: The quest for coordinated water resources development in the Zambezi River Basin

On 28h May 1987, five riparian states of the Zambezi River Basin signed an agreement at the Conference of the Plenipotentiaries on the Environmental Management of the Common Zambezi River System to implement the action plan for the Environmentally Sound Management of the Common Zambezi River System (ZACPLAN). This was the first attempt to view the Zambezi River Basin as an international rather than a multinational river basin. Particularly in the post-independence period, water management in the basin was dictated by national interests and thereby overshadowed the basin-wide perspective of water resources management (Chenje 2003; Chenje 2000). Seventeen years after the initiation of the ZACPLAN, an agreement to establish the Zambezi Watercourse Commission was signed as a regional instrument mandated to lead international water resources management in the basin in a coordinated and integrated manner. The ZAMCOM agreement was ratified in June 2011, effectively establishing it as a legal institution for coordinating international water resources management in the Zambezi River Basin. This was a milestone considering that basins without treaties are more conflictive and that an existing treaty would go a long way to obviate a potential conflict (see Wolf et al. 2003).

This chapter aims to shed light on the underlying reasons behind the evolution of international water management in the Zambezi River Basin during this period, and provides an assessment of the overall implications for water resources management in the basin. The chapter explores various factors, including the shifting of water management paradigm, political and economic factors as well as the role of international institutions, in order to explain why the Zambezi River Basin Action Plan (ZACPLAN) was initiated. The chapter further explores the transitions that took place from the signing of the ZACPLAN agreement to the time when an agreement to establish the Zambezi Watercourse Commission (ZAMCOM) was signed. The chapter ends by highlighting some of the challenges that ZAMCOM might have faced in the implementation of its mandate, particularly the integrated water resources management (IWRM) strategy for the Zambezi Basin (ZAMSTRAT) if Zambia, a key riparian state, had remained a non-party to ZAMCOM. The key argument in this chapter is that international water resources management can hardly succeed if it is initiated as a purely political process, despite some scholars arguing that international water management is a political process. The role of geography in river basins and related asymmetries as well as hydrological characteristics must be incorporated into such processes in order to provide enough incentives to all riparian states to participate in the process.

This thesis argues that the expression of interest to cooperate on the management of the Zambezi River waters requires a deeper analysis in order to bring to the surface the underlying reasons. Interestingly, conflict and cooperation studies have identified situations where international cooperation over water resources is likely. As stated in chapter 2, available literature reveals that where water is abundant or water supply outstrips demand by a large factor, cooperation is unlikely due to lack of incentives to cooperate. Giordano and others also argue that where water scarcity is high, the outcome is likely to be similar, meaning that conflicts are more likely in situations where water availability is neither scarce nor abundant (see Dinar et al. 2007). That is to say, cooperation is less likely in situations where water resources are abundant and where water resources are scarce, as the presence of abundant water reduces the incentive to cooperate and severe scarcity limits the ability of the states to share (see Dombrowsky 2007; Dinar et al. 2007). It is therefore in situations where water supply becomes limiting or where environmental degradation becomes apparent that cooperation may be induced in order to avert conflicts and increase mutual gains.

For this particular study, neither of these situations was present in the Zambezi River Basin when the riparian states expressed interest to coordinate management of the Zambezi River waters. Moreover, water relations in the Zambezi River Basin were generally non-conflictive in the 1980s. The analysis of the institutionalisation of the Zambezi River Action Plan (ZACPLAN) therefore benefits from exploring a number of important factors. In short, this thesis argues that this initiation was a result of multidimensional changes (social, economic, political, hydrological) taking place at various spatial scales i.e. national, regional and global.

4.1. The Zambezi River Basin states and regional integration

In order to unravel the politics surrounding the development and adoption of the ZACPLAN as a basin programme, it is important to understand the political context of its initiation. This analysis is carried out on the premise that "countries which cooperate in general cooperate about water" (Wolf et al. 2003: 43). This also helps to shed light on why the ZACPLAN faced several challenges in its implementation.

As previously discussed in chapter two, politics play a significant role in regime formation in international river basins. It is therefore only proper that political developments in Southern Africa should be discussed in light of the ZACPLAN. From the discussions in chapter three, it has been highlighted how the decolonised states in the Zambezi River Basin and Southern Africa in general were still significantly dependent on South Africa's own economy. Their total political independence was hindered by this economic dependence. The liberation struggle for political independence had to be approached from other dimensions as well.

In order to support the struggle for independence for the states that were still under white minority rule, five states initially formed an informal grouping known as the

Frontline states (FLS) (SADC webpage; the Heritage Foundation 1979). The Frontline States at formation comprised of Angola, Botswana, Mozambique, Tanzania and Zambia with the later addition of Zimbabwe when granted independence in 1980 (Barber 1988).

The need to liberate Southern Africa states from minority white rule was central to the FLS and the states provided some assistance to the liberation fighters in Zimbabwe and Namibia from 1974 (Anglin 1993). This assistance ranged from political, diplomatic to military, even though very limited militarily for fear of provoking South Africa's aggression (see Evans 1984). When Zimbabwe gained independence in 1980 and effectively became a member of the FLS, the attention of the Frontline States shifted solely to South Africa because of its apartheid regime and continued occupation of Namibia. However, taking down the government in Pretoria was no mean task as the South African Government had the military, economic and technical capacity to fight resistance to its political hegemony in the region.

The FLS realized that achieving total political independence and liberating the remaining states was improbable as long as there was economic dependence on the apartheid regime (SADCC 1980). Nonetheless, some characteristics of the FLS could challenge the role of the grouping economically and achieving regional integration primarily because of its informal nature. Being an informal grouping, the FLS did not have an institutional coordinating body and while agendas were agreed on consensus, disagreements were let to stand and most importantly national agendas were not hindered by the group's positions (see Evans 1984). Most notably at this particular time, Southern Africa was fragmented with some of the independent states remaining strongly dependent on South Africa for their economies (Doxey 1975; Anglin 1983). The FLS focus on and total commitment to anti-apartheid cause and its informal nature was not the right channel to facilitate economic integration and engage donors. At the same time the South African government was playing with the idea of establishing the

Constellation of Southern Africa States (CONSAS), a regional economic group that would strengthen South Africa's position in the region by giving a political legitimacy that it never had (see Evans 1984). Thus by the end of the 1970s, the FLS widened its scope to encompass economic cooperation in order to effectively weaken the position of the South African Government in the region by isolating it further. The idea of the Southern Africa Development Coordinating Conference (SADCC) emerged as a result, a formal institution that would facilitate economic integration in the region, coordinate regional projects and fast track the independence of Namibia (SADC webpage; Evans 1984).

Economic cooperation provided an avenue for the FLS to actively engage those states in the region that were still closely tied to the government in Pretoria, namely Malawi, Swaziland and Lesotho (Anglin 1983). Seretse Khama, the president of Botswana who embraced the idea of an economic community in Southern Africa, facilitated a meeting of foreign ministers from independent states in May 1979 in Botswana to determine the mechanisms of establishing economic cooperation among the independent states in Southern Africa (Salman 2001). The 1980 Lusaka Declaration entitled "Southern Africa: Towards Economic Liberation" formerly founded SADCC and the group comprised all the members of the FLS as well as Malawi, Lesotho and Swaziland (SADCC 1980; Salman 2001; Barber 1988). Under the framework of the SADCC, the Southern African states aimed to secure international cooperation, advance regional integration, and mobilise resources efficiently as a pragmatic approach to reducing economic dependency on South Africa and the western world (SADCC 1980; Barber 1988). In this line of argument, the determination among the liberated states of Southern Africa to increase cooperation in the region can be viewed as a reaction to the persistence of the apartheid government in South Africa to remain in power (Palloti 2004; see also SADCC 1980). By also recognizing the role of globalization, the institutionalization of SADCC was meant to be a channel for accessing donor funds for the facilitation of economic integration in Southern Africa, estimated to cost around USD 1.5 Billion (SADCC 1980).

SADCC had four key objectives which included:

- “the reduction of economic dependence, particularly, but not only, on the Republic of South Africa;
- the forging of links to create a genuine and equitable regional integration;
- the mobilization of resources to promote the implementation of national, interstate and regional policies;
- concerted action to secure international cooperation within the framework of our strategy for economic liberation” (SADCC 1980: 4-5).

In line with the ZACPLAN, the SADCC agreement made provisions for joint projects in exploiting natural resources with particular reference to international river basins (SADCC 1980). Furthermore, SADCC also envisioned regional coordination in energy utilization through regional trade in petroleum products and electricity, ideally through interconnection (SADCC 1980). The institutionalization of SADCC was a show of regional solidarity against South Africa’s apartheid regime. The FLS continued to exist side by side with SADCC since Namibia had not yet gained independence. While security cooperation was still central to the FLS, most civil projects envisaged under the SADCC arrangement still reflected the liberation struggle against the apartheid government (Palloti 2004). In other words, while the rationale of forming SADCC was for economic liberation, the impetus of establishing the institution was political in nature (see Meyns 1999). This is the political context in which the ZACPLAN was initiated and later adopted by the Zambezi River Basin countries.

4.2 The Changing water resources management paradigm

The fundamental reason to engage the Zambezi River Basin states in the ZACPLAN at the beginning of the 1980s was to prevent a possible future water-related conflict based on the changing discourse in international water resources management. The rationale to conflict prevention is that it is less costly than to resolve a conflict when it emerges (see Wolf 1998). The low levels of water exploitation in the basin as compared to available runoff rendered water issues secondary within international relations. To date, water supply generally outstrips demand in the basin (World Bank 2008). For this particular reason, water-related issues could not provide enough incentives for the basin states to engage in the ZACPLAN.

Globally, there were few serious discussions on international water management in the 1970s and 1980s because many countries harboured strong national interests, a situation that was mirrored in the Zambezi River Basin (see Biswas 2008). Being a recent phenomenon, a nation state in the third world would not be easily relinquished for the sake of joint utilization of shared natural resources (Waterbury 1979). A sectoral report on energy at the beginning of the 1980s by Munslow & O'Keefe instance indicated that the basin states prioritised national self-sufficiency for the most important economic resources, which limited energy resource development (see chapter three). Yet by 1985, a working group on the development of an environmentally sound management plan for the commonly shared Zambezi River waters was formed, consisting of technocrats from Malawi, Botswana, Tanzania, Mozambique, Zambia and Zimbabwe under the direction of the United Nations Environmental Programme (UNEP). What could have changed in the basin in such a short period of time for the riparian states to seek coordinated water management? Since the initiation of the ZACPLAN cannot be duly explained by the actual need to manage the water resources in the basin, coupled with the fact that water management is multidimensional, explanations regarding this important development must originate from several areas.

ZACPLAN is considered by many scholars to be a baby of the United Nations Environmental Programme (UNEP) through its Environmental Sound Management of Inland Waters (EMINWA) programme (see Nakayama 1998, Kalapula 1989; Spector 2001). UNEP as an organisation itself was born from the changing perceptions of environmental management including water resources. The popular appeal of grand water engineering schemes in the middle of the twentieth century was increasingly becoming questionable. From the 1960s, several scholars started publishing critiques of the dominant approaches to environmental management including exploitation of water resources. Critics highlighted the flaws of the conventional approach to social and economic development which failed to regard the overall integrity of the environment (Heathcorte 1998). Authors such as Rachel Carson (see Heathcorte 1998) published papers in the 1960s that questioned the social and environmental implications of water resource utilisation for industrial purposes. In the context of the Kariba Dam hydro-electric power project, Elizabeth Colson and Thayer Scudder questioned the overall benefit of large dams in relation to their social and environmental implications (see Scudder 2005).

As a result of the growing public debate on the impact of development on the environment, the Stockholm Conference on the Human Environment was conducted in 1972 to address environmental related issues (see Moltke 1996). The United Nations General Assembly adopted UNEP as one of its programmes in the same year the conference was held (American Society of International Law 1988). Working with states across the globe, UNEP was mandated to facilitate states to incorporate environmental issues into the management of water resources (Kalapula 1989). In 1977, five years after UNEP was established, the United Nations sponsored the Conference on the Human Environment which adopted the Mar del Plata Action Plan on Water Development and Administration to which the ZACPLAN made reference in its opening statements of the agreement (American Society of International law 1988: 1112). The Mar del Plata conference, held in March 1977 in Argentina, mainly focused on coordinated water resources development (see Heathcorte 1998: 2), even though it did not actually focus on international water management. Nations were encouraged to develop comprehensive management plans for water resources.

In terms of the ideas of water, the 1980s and 1990s saw the proliferation of literature on water wars that was closely linked to environmental as well as national security (Turton 2008). The water wars theory propagated in this type of literature resonated with the media (a powerful and influential institution itself) and some multilateral institutions. In addition, statements by important political figures such as the Egyptian President Boutros Boutros-Ghali about water as the most likely cause for future wars in the Middle East only served to strengthen the water wars thesis. Furthermore, the World Bank's Vice President Ismail Sarageldin's 1995 assertion that water would be the catalyst for wars in the next century (Tvedt 2011; Wolf et al. 2006) aimed to ascertain the centrality of water in the global society.

These pessimistic views derived from neo-Malthusian positions aimed to highlight the inescapable conflict surrounding water utilisation and allocation among the riparian states, as water is perceived as a matter of national security in the face of water scarcity (Gleick 1993). Closely associated with Hardin's tragedy of the commons theory, the argument was simple. In an environment of increasing water scarcity, riparian states would rigorously strategise to maximise their water allocation in an effort to meet escalating water demands ensuing from burgeoning populations and increasing socio-economic development (see Gleick 1993). However, water being a finite resource, a point could be reached where water demands could not be reconciled with supply and the need to exploit the dwindling water resources could potentially lead the riparian states to a violent conflict. It was a narrative that aimed to generate a sense of urgency requiring an immediate and powerful response in order to obviate a potential catastrophe. Unless riparian states cooperated on the development of international water resources and allocated water equitably, conflict over water was an inescapable outcome. While this theory seemed to progressively gain ground, others started to view cooperation on the development of international water resources as a solution to future water related problems.

It was in this context that the idea to initiate the ZACPLAN was sold to the Zambezi River Basin states. The need to employ measures to prevent future conflicts is evident in the initiation of the ZACPLAN and is clearly highlighted in the action plan. Even though the situation in the Zambezi River Basin was signficantly tilted towards supply rather than demand, some scholars have pointed to the spatial and temporal availability of rainfall and runoff as sufficient reason to justify the ZACPLAN. Furthermore, population increases coupled with rising living standards, increased urbanisation, and improved delivery of water services to the rural population were expected to increase water demands and thereby increase the likelihood of conflict if not well managed (Euroconsult Mott McDonald 2008; Spector 2001).

Attributing the ZACPLAN solely to the changing ideas of water and the increasing focus on environmental issues could nonetheless be misleading. The dissemination of ideas of water in academic circles and the media, though influential, cannot singlehandedly bring changes to the institutionalisation of water issues. This chapter therefore argues that the initiation of the ZACPLAN could not be induced by such global changes in water management discourses alone. On the contrary, the adoption of the new water management discourses, whether wholly or in part by powerful institutions that worked closely with the basin states, partly influenced the adoption of the ZACPLAN. Most importantly, as it has been highlighted earlier on in this chapter, it must also be argued that the prevailing political situation in Southern Africa in the 1970s and 1980s played a greater role in the adoption of the ZACPLAN as a programme for the basin. After all, as argued in chapter 2, politicians hold the final key to cooperation over water.

4.3 Politics, the economy, regional institutions and the ZACPLAN

The cooperation between UNEP and the Zambezi River Basin riparian states that resulted in the signing of an agreement in 1987 to execute an action plan for the management of international waters was facilitated by the characteristics of both

UNEP and the Zambezi River Basin states. This is particularly true considering that UNEP's focus on the Zambezi River Basin was not a result of long-term studies in the basin to necessitate an interventionist strategy. The basin experienced no water-related conflicts; water utilisation was significantly low; the basin had low population (around 20 million as per 1987 population estimates) compared to other major international river basins in Africa; and the basin was characterised by a lack of water infrastructure. At the same time, there were no prospects of escalated water demand in the short to medium term either through changes in agricultural production or through new water engineering projects. Furthermore, security concerns in the region due to violent conflicts in Mozambique and Angola coupled with numerous destabilisation activities by the apartheid government (see Evans 1984) did not create a conducive environment for foreign direct investments. In the course of implementing the IMF and World Bank structural adjustment programmes in the 1980s, most of the riparian states also lacked the financial capacity to invest in water and energy infrastructure. Thus, at least in the short to medium term, there were no indications that water issues would become central to international relations among the basin states. UNEP's participation in the ZACPLAN at this particular time can therefore be explained partly by the politics surrounding the institutionalisation of UNEP itself as well as the overall political and economic environment in the Zambezi Basin.

At the time when UNEP was adopted as a UN programme at the United Nations General Assembly held in 1972, many countries across the globe failed to give environmental issues due consideration in the planning and development of government programmes. In fact, environmental considerations within programme development were seen as an unwelcome additional cost (von Moltke 1996). As a result, UNEP did not receive adequate support from many governments across the globe after its establishment. Furthermore, other multilateral institutions were not interested in competing with UNEP for funding and influence and as such UNEP was limited in its mandate and funding. In order to ensure that UNEP was not a competitor, it was headquartered in Nairobi, Kenya, far away from New York and Geneva where important issues in the UN system are decided (von Moltke 1996).

With its headquarters in Africa away from the UN system and with its African Chairman, UNEP received support from most African leaders and governments (Nakayama 1998), which was expected, considering that most of the African states had just been decolonised. It also meant that UNEP largely focused on Africa's international river basins (Nakayama 1998). However, with a limited mandate, i.e. only acting as an advisory institution and not an implementing agency, coupled with limited funding, UNEP's flexibility in promoting its environmental agenda in many important river basins was limited. When UNEP launched its Environmental Sound Management of Inland Waters (EMINWA) programme in Africa in 1986, some of the key basins in the continent were already implementing programmes with other multilateral institutions with which UNEP could not compete for influence. UNEP's EMINWA programme aimed to work with the riparian governments in international water basins to integrate environmental issues into the exploitation of water resources. EMINWA as a programme envisioned harmonised water resources and environmental protection through reconciliation of varied interests among the basin states (Nakayama 1998).

The first African Ministerial Conference on the Environment (ACMEN) which supported UNEP activities recommended the Zambezi River Basin Action Plan (ZACPLAN) as a priority project when it adopted the Cairo Programme of African Cooperation held in December 1985 (Kalapula 1989). This took place a year after initial consultations were held between UNEP's Executive Director and representatives from the governments of Zimbabwe, Zambia and Botswana on the concept of the ZACPLAN (Nakayama 1998). The Zambezi Basin thus became a key focus of UNEP. UNEP had two other programmes including one on the Lake Chad Basin and another on the Nubian Sandstone Aquifer under the African Inland Water

Programme[19] which was a sub-programme of the EMINWA programme (Nakayama 1998). As one of its landmark programmes under EMINWA, UNEP as well as the African Ministerial Council on the Environment were interested in the success of the ZACPLAN as it had the potential to showcase the influence of both organisations (Nakayama 1998). The African continent was not generally influential in leading discourses and a programme such as ZACPLAN could prove otherwise.

While the politics surrounding UNEP certainly had an influence on the adoption of ZACPLAN, they alone cannot duly explain why the Zambezi River Basin states welcomed the idea of ZACPLAN, let alone rapidly signed an agreement within a short period after the initial consultations. A better explanation can be achieved by focusing on the basin states themselves and particularly their political and economic environments.

Historically, the World Bank has been a major financer of large-scale water engineering projects. Indeed, the first loan to a developing country was partly for the purpose of developing a hydropower plant in Chile in 1948 (Salman 2009). The World Bank issued an Operating Memorandum Status (OMS) 2.32 in April 1985 resulting from 35 years of the World Bank's experience in financing projects on international rivers. At the core of this OMS were policy objectives relating to riparian cooperation and the need to notify other riparian states of the Bank's financed projects (Salman 2009). This implies that a certain level of cooperation among the basin states was required in order for the bank to financially support water engineering projects

Institutions like the World Bank are influential in water resources management and paradigms in the developing world because of their technical and financial role in

[19] Specifically mentioned in the ZACPLAN agreement under item three of the introduction (American Society of International Law 1988: 1116)

large-scale water projects. No wonder the Bank has been the largest donor financing the development of large dams. At the same time and since the 1980s, the Bank has progressively introduced certain conditions to its loans to ensure that such projects at least take consideration of their social and environmental implications (Scudder 2005; see also Wolf et al. 2003). Most developing countries, such as those in the Zambezi River Basin, often lack financial capital to unilaterally develop water resources for social and economic development. These states therefore often seek the assistance of multilateral institutions such as the UN, international financial institutions notably the World Bank and International Monetary Fund (IMF) and various western governments. This means that overall international water management is partly influenced by aid conditions laid down by western governments as well as international financial institutions, and by multilateral institutions. In some cases, this can lead to significant changes in institutional arrangements and compositions.

When the idea to initiate the ZACPLAN surfaced in 1984, Malawi and Zambia were already implementing the World Bank and IMF recommended structural adjustment programmes (SAPs) (see Loxley 1990). The goal of the SAPs was to kick-start the two nations' economies, reduce balance of payments, minimise public expenditure, and ease institutional impediments to foreign capital in order to attract foreign direct investments (Logan & Mengisteab 1993). Mozambique, though practicing Marxism, was in the process of aborting this political system in order to seek financial aid from the International Finance Institutions (IFIs). The government of Mozambique finally renounced its Marxist political ideologies and practices in 1989 (Coker 1991). These structural adjustment programmes signified the increasing dependence of the Zambezi River Basin States on international donors (Scarritt & Nkiwane 1996).

At the same time, the World Bank was undergoing its own transitions with regards to principles and practices surrounding financing of major water projects in international river basins. For instance, the World Bank's document OMS 2.32 released in April

1985 required that water projects in an international river basin seeking funding from the World Bank had to be acceptable to several riparian states. These World Bank procedures were not really pushing for integrated water resources management (IWRM) in international water resources but rather aimed at increasing international water cooperation. Prior notification was thus integrated into the Bank's principles (see McCaffrey 2007). The ZACPLAN in this context was a positive step towards securing the Bank's financial assistance in large-scale water engineering projects.

While the changes to the water management paradigm, the role of UNEP and of course changing principles and procedures in World Bank-funded projects partly influenced the adoption of the ZACPLAN, it is also important to understand the role of liberation politics in the willingness of the Zambezi River Basin states to adopt the ZACPLAN. Political scientists, as highlighted in chapter two, argue that international relations are complex because they are multidimensional. This means that incorporating water issues into international relations only increases this level of complexity. This is particularly so as the management of water resources is already complex at sub and national levels. The process therefore to formulate an integrated management plan for the whole basin might as such be long and complex.

Analyses on water cooperation suggest that water cooperation in international river basins is facilitated when there exists a history of cooperation among the basin states (Conca et al. 2003; Wolf et al. 2003). However, there are several agreements that have been established between riparian states that have limited or no cooperation at all on many fronts. The case of the Indus water agreement between India and Pakistan signed in September 1962 is a good example. This agreement was signed at the time when political tensions between the two countries were rife. Biswas argues that it was the untiring commitment of the Head of the World Bank at that time, who made it his personal project, in addition to the monetary incentives that enabled the two countries to conclude a water-sharing agreement on the Indus waters (Biswas 2008).

Nonetheless, this was never replicated in other watercourses between the two states as well as between India and other riparian states in India's international river basins.

In the context of the Zambezi River Basin however, the political cooperation among the independent states proved pivotal in the adoption of the ZACPLAN. As highlighted earlier on in the chapter, efforts to liberate states within Southern Africa that were still under white minority rule by some of those that had gained independence led to the establishment of an informal grouping, the Frontline States. In order to widen the scope of the FLS beyond political and military support in the liberation struggle, SADCC was created to provide an avenue of increasing cooperation among the independent states in Southern Africa and isolate South Africa further (SADCC 1980; Evans 1984). The establishment of SADCC forced South Africa to accelerate its policy of destabilization in Southern Africa in order to maintain its hegemony (see Evans 1984). Attempting to remain undeterred by South Africa's aggressive actions, the FLS sought more areas for cooperation as a way of exemplifying their solidarity. The idea of the ZACPLAN provided a great opportunity for enhancing cooperation but was also in line with what was provided in the SADCC agreement on cooperation in international basins (see SADCC 1980).

The FLS's political influence in the adoption of ZACPLAN is indisputable as all the members who signed for the ZACPLAN in Harare in 1987 were members of the FLS. Angola was the only member of the FLS not to be party to the initial agreement. It was this strong focus on the struggle against the South African Government that facilitated the adoption of the idea of the ZACPLAN when it emerged through consultations between UNEP and some of the FLS members in 1984. The South African Government had also previously contemplated tapping the Zambezi River waters in the future through inter-basin transfer projects, the Chobe-Vaal project in particular (Spector 2001). With South Africa's economic and technical capabilities, this idea did not seem far-fetched and the FLS were uncomfortable with it. The idea of managing the Zambezi waters collectively at least obstructed the potential of South Africa to exploit the waters of the Zambezi River.

The attraction of the ZACPLAN for the riparian states in the 1980s was therefore mainly its political value which also eventually hampered its implementation (see Nakayama 2003). In the political context of the 1980s Southern Africa, the idea of the ZACPLAN afforded the FLS members another strategic opportunity to exemplify solidarity among the black-ruled African states on the one hand and to isolate the government of South Africa in the region on the other (Spector 2001; Nakayama 1998). Thus, by forming links between water cooperation and demonstration of political and social solidarity at a regional level, cooperation was easier to attain. Nevertheless, using the ZACPLAN as a political showpiece meant that the physical characteristics of the basin, which are important components in international water management, were given secondary consideration by the riparian governments. This kind of foundation for international water management proved problematic for the smooth and satisfactory implementation of the ZACPLAN.

4.4 From the ZACPLAN to the Zambezi Watercourse Commission (ZAMCOM)

The ZACPLAN agreement was signed at the Conference of Plenipotentiaries on the Environmental Management of the Common Zambezi River System convened by UNEP and hosted by the government of Zimbabwe in Harare (American Society of International Law 1988; Nakayama 1998). Held on 26-28 May, the governments of Botswana, Mozambique, Tanzania, Zambia and Zimbabwe signed the agreement on 28 May 1987. The government of Malawi was not party to the agreement and was the only other state that had participated in the technical working group leading to the drafting of the ZACPLAN (Nakayama 1998; Kalapula 1989). The working group also encompassed representatives from other UN agencies, SADCC member states and the United Nations Council on behalf of Namibia. Angola on the other hand had no representation in the working group (American Society of International Law 1988).

The ZACPLAN agreement was concluded barely two years after the ACMEN adopted it as a priority project and barely a year after the establishment of the EMINWA programme under which this programme was implemented. The agreement itself constituted five articles which comprised the action plan in article 1; institutional and financial arrangements in article 2; national focal points in article 3; implementation of the plan in article 4; and final clauses in article 5. The action plan was based on a diagnostic study that formed part of the four action steps suggested by the technical working group, which first met in Nairobi in April 1985, then in Lusaka, Zambia in March 1986 and finally in Gaborone, Botswana in January 1987. The diagnostic study, as the first step in the process, aimed to define specific environmental problems and their impacts based on the prevailing state of the ecology as well as environmental management of the river system. This was undertaken in the period between 1985 and 1987 by the technical working group of experts. The second step was the preparation of the draft action plan followed by the adoption of the plan itself including its legal framework and institutional machinery. The last step of the action plan was the actual implementation of the plan with periodic monitoring and evaluation activities (American Society of International Law 1988).

The goal of the ZACPLAN was to develop water resources in the basin and manage the environment in a coordinated fashion in order to avoid future conflicts (American Society of International Law 1988). A number of problems related to general water use and the ecology in the basin were identified for intervention. In addition, the action plan also identified a lack of public participation in water resources management; poor information exchange among the basin states on climate as well as water quality and quantity; poor planning of resource use; lack of information on the environmental impacts of large-scale water use such as hydropower development and irrigation; and lack of cooperation and coordination both at national and basin level, as the main problems involved in the environmentally sound management of the water resources (American Society of International Law 1988).

The action plan identified four core areas by which to achieve the objectives of the ZACPLAN. These areas encompassed *environmental assessment* focusing on the "systematic assessment of the main factors influencing water management and water-related environmental quality"; *environmental management* focusing on the "proper management of the resource by taking into account the assimilative capacity of the environment, the development goals as defined by the national authorities and the economic feasibility of their implementation"; *environmental legislation* focusing on "the development, review, and, when necessary, expansion, updating and strengthening of the national laws and regulations pertaining to the protection and development of the river basin and its coastal and marine environment, as well as improving the enforcement of national laws and regulations relating to the river basin and its coastal marine resources"; and *supporting measures* focusing on "the formulation of intensive training programmes for personnel from the basin and other SADCC states in order to support the activities of the regional cooperation programme" (American Society of International Law 1988: 1119).

The ZACPLAN apparently placed greater emphasis on environmental issues in the plan to manage the Zambezi River waters jointly, probably as a result of the influence of UNEP. Nakayama asserts that the ZACPLAN was unique because, unlike other agreements in other river basins such as in the Mekong and Niger, environmental issues were well-integrated into the action plan for the Zambezi River waters (Nakayama 1998).

The ZACPLAN was designed to be implemented through a series of projects termed as ZACPro. There were 19 projects in total grouped into two categories. Category one consisted of eight projects while the rest fell into the second category and those in category two were only meant to be implemented if funds permitted. Category 2 projects included ZACPro 12 on energy whose sub-category 3 aimed to explore the practicality of linking the major hydropower projects in the basin, including markets (American Society on International Law 1988). On the other hand, ZACPro 17 aimed to explore the feasibility of water transfers to other basins for sustainable development (American Society for International Law 1988). This could have been in the interest of all the riparian states south of the Zambezi River where exogenous water accounts for a larger percentage of their water resources. However, the implementation of the ZACPLAN concentrated on projects grouped in category one because they were considered as core projects and these comprised the following:

ZACPRO 1:	Prepare an inventory of existing and potential development, evaluate the environmental impact of major projects and initiate the basin-wide exchange of information
ZACPRO 2:	Develop regional legislation necessary for the management of the Zambezi and the minimum national legislation required by riparian states for enforcement
ZACPRO 3/4:	Development of human resources, administrative and institutional structures and technical capabilities in riparian states to enable the aims of ZACPLAN to be achieved
ZACPRO 5:	Develop a basin-wide unified monitoring system related to water quality and quantity
ZACPRO 6:	Develop an integrated water development and management plan for the Zambezi
ZACPRO 7:	Environmental education and participation in ZACPLAN
ZACPRO 8:	Establish minimum standards for drinking water and waste water disposal

Figure 6. ZACPLAN projects under category 1.
Source: Aasand et al. 1996: 47

Donors including UNEP and other UN agencies pledged to cover the total costs of the first year activities for the projects in category 1 which were scheduled for implementation between 1987 and 1989, to the tune of 1.6 million US Dollars. The participating countries were expected to contribute half a million US Dollars as regular contributions, and another 1.9 million US Dollars for specific projects, with the donors and UN agencies including UNEP contributing 2.6 million US Dollars, or slightly more than half of the expenditure in 1988. The participating countries were expected to contribute the same amount in 1989 with a slight increase in contribution from UNEP and other UN agencies combined, by two hundred thousand US Dollars each. The total estimated cost for the first phase was 12 million US Dollars (American Society for International Law 1988). The participating member states of the ZACPLAN were expected to contribute equally to the common cost of the ZACPLAN pegged at 12.5 per cent for each state (American Society for International Law 1988).

4.5 Implementation of the ZACPLAN: challenges

It did not take long to recognise that the progress of implementing the ZACPLAN was sluggish. Of course the sluggish implementation of the ZACPLAN should not be seen as unique in general terms considering that cooperation in general emerges gradually even in circumstances that warrant prompt resolutions to an emerging conflict (see Dinar et al. 2007). In the context of the Zambezi Basin, this is even less unique given the circumstances in which the idea of the ZACPLAN had been initiated. While the basin states approved and adopted the ZACPLAN with considerable speed, nationalistic sentiments became apparent right from the signing of the agreement. The basin states rejected the idea of establishing a special secretariat for the operationalisation of the ZACPLAN and instead preferred the programme to be administered by SADCC (Nakayama 1998). Scholars have viewed this as strange considering that an important part of the ZACPLAN was the formation of a basin-wide institution as a tool for coordinating basin-wide planning and integration as well as donor coordination. Formal institutions in international water management are normally required to, among other things, facilitate information sharing which is critical in expediting cooperation (see Dombrowsky 2007). Pushing the programme to the SADCC meant that the leadership of the programme would fall under the SADCC Environment Land and Management Sector (ELMS) which was based in Maseru, Lesotho, a state outside the basin. For pure water and environmental management, this development was counterproductive, particularly considering that the SADCC as an institution did not have a good track record in fostering multilateral agreements among its member states and was considered by many to be weak (see Scarritt & Nkiwane 1996; see also Meyns 1999).

The work by Rangley, Thiam, Andersen and Lyle on International River Basin Organizations in Sub Sahara Africa is utilised here to explain why the implementation of the ZACPLAN faced many challenges. These authors outline six characteristics of successful river basin organisations and, even though there was no river basin organisation, the idea behind the ZACPLAN was to have such an organisation from the onset (see Nakayama 1998; American Society for International Law 1988). The ZACPLAN included the planned establishment of the Zambezi Intergovernmental Monitoring and Co-ordinating Committee (ZIMCC). Its mandate would be "to co-ordinate and provide operational and policy guidance for the implementation of the Zambezi Action Plan, to follow-up the progress of its implementation, and to evaluate its results" (American Society for International Law 1988). What the work by Langley and others on river basin organisations in Africa highlights among others are the problems of politicising international water management.

Successful river basin organisations in Africa have demonstrated six characteristics as outlined by Rangley et al.:

- "real need for development with emphasis on socio-economic benefits rather than political aspirations;
- well-focused and technically sound objectives;
- emphasis on the construction of works rather than on planning;

- very few number of countries;
- strong commitment by member countries;
- active support from ESAs" (Rangley et al. 1994: 21).

By all accounts, strong political reasons other than the need to manage water effectively facilitated the initiation of the ZACPLAN. This is not to categorically state that hydrologic characteristics in the basin did not have any influence. The water surplus situation in the Zambezi River Basin may have also played an important role since the riparian states could easily reach an agreement without any significant changes in their water use and access. In other words, water access was a non-issue. Compared to other river basins experiencing water scarcity problems, international water agreements are problematic because of the states' perceptions of such processes as zero-sum games, where gains by one state can only be achieved at the expense of another (see Dombrowsky 2007). For this particular reason, some scholars have questioned why the implementation of the ZACPLAN was sluggish (see Biswas 2008). Nonetheless, the role of water in facilitating the ZACPLAN should be viewed as passive.

Considering the strong political basis of the ZACPLAN in contrast to other factors, there are two possible reasons why the governments of the riparian states preferred SADDC-ELMS to implement the ZACPLAN rather than a special secretariat hosted in one of the countries and in this particular case Zimbabwe (see Nakayama 1998). Because there was no apparent need for the riparian states to engage each other to allocate water equitably, the riparian states' governments preferred implementation by SADCC with its broader mandate. As argued above, the institution of the ZACPLAN and the desire to establish ZAMCOM was a proactive approach rather than reactive since no water disputes existed and water supply outstripped demand by a large factor. This obviates the need for cooperation and yet, experience shows that implementation of coordinated and integrated water management at international level is best when conflicts have not yet arisen (Dinar et al. 2007).

Operationalising the ZACPLAN under the leadership of SADCC, the states could afford to sideline it while attending to urgent national priorities. SADCC with its limited capacity i.e. limited funding and inadequate staff, would be limited in carrying out its mandate (see Aasand et al. 1996). Acting also in national self-interest, the institution of SADCC fitted very well as its agreement allowed national agendas to take precedence if and whenever national agendas could not be reconciled with regional programmes (see Barber 1988). With such arrangements in place, it could have therefore been difficult for the riparian states to commit fully to the ZACPLAN process. The Southern Africa states evidently demonstrated nationalistic tendencies in dealing with regional issues, particularly regarding energy security as in the case of Zimbabwe highlighted in chapter 3.

The second possible reason could be the political and economic relationship between the governments of Zambia and Zimbabwe. Since Zimbabwe's independence, the government of Zambia sought financial compensation from the government of Zimbabwe for the economic and developmental infrastructure in that country that was financed by the economic resources from Zambia (particularly the mining sector) during the years of the Federation of Rhodesia and Nyasaland (Scarritt & Nkiwane 1996). Since the funding mechanism for the ZACPLAN required the basin states to contribute finances to the process in addition to other funding sources, the government of Zambia was reluctant to continue contributing from its coffers to the development of infrastructure in Zimbabwe. Furthermore, in 1987 when the agreement to implement the ZACPLAN was signed, the Central Africa Power Company (CAPCO) formed during the colonial years was reconstituted to form the Zambezi River Authority on 1 October 1987 (ZRA) (Scarritt & Nkiwane 1996). This followed an enactment of the ZRA Acts in both Zimbabwe and Zambia (Santa Clara 2000). Under the new arrangement, the ZRA was only responsible for the dam and the powerhouses were devolved to the power corporations, the Zambian Electricity Supply Corporation (ZESCO) and the Zimbabwe Electricity Supply Authority (ZESA) in their respective countries (Soils Incorporated (Pty) Ltd et al. 2000; Mukono & Mulendema 2000). This is well stipulated in article nine of the Zambezi River Authority Act (FAO 1997). This new arrangement challenged the relationship between the two governments as they failed to agree on how to allocate the assets under CAPCO and subsequently approached the International Court of Justice to settle the matter (Scarritt & Nkiwane 1996). In this context, the Zambian Government was unwilling to have a secretariat hosted by Zimbabwe in charge of implementing the ZACPLAN as that could have been similar to the federal arrangement. Furthermore, Robert Mugabe's arrival on the scene after Zimbabwe's independence somehow challenged the regional role that the Zambian President had enjoyed since Zambia's independence. Nonetheless, the Zimbabwean Government had the economic and military muscle to give greater leverage to Mugabe. Consequently, the Zambian leadership was uncomfortable at having the secretariat in Zimbabwe as they believed the government of Zimbabwe could easily patronise the process given that the Executive Secretary of SADCC was also Zimbabwean.

One notable development at the signing of the ZACPLAN in 1987 was that the government of Malawi failed to send a representative even though it was part of the technical working group that drafted the action plan. Two possible reasons can be suggested for this. Firstly, the Malawi Government was a close ally of the government of South Africa. If this process was somehow perceived to be just another attempt to isolate the South African Government, Malawi could not be wholly supportive of such efforts. Even though Malawi was part of SADCC and the main aim of SADCC was to deal with the question of South Africa with regards to economic relations, SADCC member countries became increasingly dependent on South Africa for their economies after the establishment of the organisation (see Anglin 1985). Nonetheless, it was very unlikely that the government of Malawi opted out from signing the ZACPLAN agreement because of its political connotations, since it was already part of the SADCC whose main objective was to isolate the government of South Africa. The most likely reason was the increasing political tensions between the government of

Malawi and some of the riparian states as a consequence of events that occurred in 1986, a year before the ZACPLAN agreement was signed.

The foreign relations between the governments of Malawi and Mozambique were strained because of the open policy that the government of Malawi maintained with the government of South Africa. Considering how damaging the destabilisation tactics of the government of South Africa were, this policy was frustrating to several of the Southern African leaders. The presidents of the republics of Zambia, Zimbabwe and Mozambique in 1986 accused the Malawian president of assisting RENAMO fighters at a meeting hosted in Blantyre, Malawi and threatened to topple him (Barber 1988). Shortly after, the Mozambican president was killed and suspicions were informally levelled at the government of South Africa. The close relationship between the Malawi Government and the South African Government was challenging in this case to the FLS member states. Operating in such a political environment, it would have therefore been difficult for the government of Malawi to participate in the ZACPLAN, a regional initiative, when political relations were strenuous.

It was not unexpected for the three members of the FLS to take decisive action. Malawi’s cooperation with South Africa hampered their efforts to take down the government in Pretoria. The FLS had always given limited support to the liberation fighters in South Africa but these were mostly covert operations for the fear of retaliation from the South African Government (see Evans 1984). On the contrary, the government in Pretoria, through its destabilization tactics, inflicted huge economic costs on the FLS. These economic costs were particularly severe on Zimbabwe as destabilisation activities in Mozambique halted both the rail system and dock operations which limited the movement of Zimbabwe’s important cargo through Mozambique. The costs to the government of Mozambique were also significant considering that the cost of the conflict in Mozambique was around 10 billion US Dollars (Coker 1991). Moreover, the destruction of the power lines between Cahora

Bassa hydropower plant and the Apollo substation in South Africa not only denied the government of Mozambique an important source of revenue, but also required an estimated 500 million US Dollars to rehabilitate them (Isaacman & Isaacman 2013). For economic, security and ideological reasons, Zimbabwe was militarily and technically involved in Mozambique, carrying out repairs on the railway line and the docks at the port, at a heavy cost to the Zimbabwean Government (Barber 1988). Bringing down the apartheid government was therefore vital and the government of Malawi seemed to jeopardise these efforts.

The strong political basis for the adoption of the ZACPLAN also implied that the changing political configuration in Southern Africa since the beginning of the 1990s removed the incentives to participate in the ZACPLAN. Namibia gained independence in 1990 and the political transformations in South Africa (American Society of International Law 1993: 268) reduced the relevance of the tactics employed by the FLS upon which the ZACPLAN was initiated. Consequentially, the ZACPLAN was marred by commitment issues among the member states. The changing political landscape in Southern Africa also necessitated a transformation in the regional economic body of SADCC to accommodate the new political and economic realities both at regional and global level (Meyns 1999). As an institution responsible for the implementation of the ZACPLAN, it was a challenging time to execute the action plan. The ZACPLAN was put on hold in 1991 and requests for funding were extended to the Nordic countries (Aasand et al. 1996). In 1992, SADCC was converted to the Southern Africa Development Community (SADC) through the Treaty establishing SADC in Windhoek, Namibia on 17 August 1992 (Meyns 1999; Pallotti 2004; Salman 2001). The Treaty was concluded by the governments of Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe.

In line with the work by Rangley et al., support for the ZACPLAN process also required the basin states to have clear and technically robust objectives both at national and basin-wide level. However, to achieve this goal, the geographical realities of the basin would have to be addressed since the different riparian positions, the basin's hydrological conditions as well as sectoral water use in each state produced different incentives and interests for the states. As argued in chapter 2, agreements need to be self-enforcing for them to work and that can happen if each state is clear on its gains from the cooperative arrangement. This means that where asymmetries exist i.e. those arising from geography, there is a need to restructure incentives so that all the parties involved are equally motivated to honour a cooperative arrangement.

The work by Rangley et al. also highlighted construction work as one of the fundamentals for the success of a River Basin Organisation (RBO). This should be expected as international water projects may have to address many specifics, particularly involving the rights and responsibilities of each participating state and this can provide a better picture of available incentives to the participating states. Property rights over water are either explicitly or inexplicitly acknowledged, geographic asymmetries recognised and the issue of whether issue-linkages or side payments are required to restructure incentives are all part of the project design. For instance if Zambia and Mozambique are considered, their interests and incentives in participating in a regional body may be different based on geography, hydrology and other factors. It is unlikely that Zambia would support a project that benefits Mozambique at the expense of its own developments and vice versa. Therefore exploring their interests and incentives and identifying ways to address them in order to bring about cooperation can ultimately enhance cooperation, which is most likely addressed in construction/specific projects. The Lesotho Highland Water Project for instance between the governments of South Africa and Lesotho in the Orange River Basin addresses specific issues in the project design. The agreement stipulates the costs to be met by each state, the benefits for each state and other specific issues. In this agreement, the government of South Africa receives a specific amount of water from the project, while the government of Lesotho receives all the electricity produced from the hydropower component of the project. Thus access to electricity from the project is an incentive to the government of Lesotho whose upstream water resources are vital for South Africa's economic and social development, a downstream state to Lesotho (see Rangley et al. 1994).

The history of the Zambezi River Basin indicates that water resources management agreements, particularly in the Federation years, were undertaken in relation to planned projects i.e. the Kariba and Kafue hydro-electric power projects and the Shire Valley Project in Malawi (see Barkved 1996). In general terms, project development was the catalyst for international water agreements. It should be noted however that while construction projects require project specifics to be addressed and also highlight the need for issue linkage or side payments where geographical asymmetries exist, the downside is that they work better with a small number of states and are predominantly sectoral. The danger is that construction projects may downplay the need for a basin-wide perspective on water resources development if not planned well. The Zambezi River Authority (ZRA) agreement, and the proposed Batoka Gorge where the governments of Zimbabwe and Zambia and the Zambezi River Authority agreed to build the Batoka Gorge Dam are good examples where basin-wide implications are not addressed (Scarritt & Nkiwane 1996; Soils Incorporated (Pty) Ltd et al. 2000; Scudder 2000).

By placing the ZACPLAN under SADCC and later on SADC, those institutions were overwhelmed to implement the action plan with the much desired level of proficiency. SADCC had a broad mandate, and even though the project was implemented under the Environmental and Land Management Sector (ELMS), its mandate was also broad and geographically not limited to the Zambezi River Basin. The number of riparian states in the Zambezi River Basin alone is challenging, as research by Langley et al. suggests that levels of success for an RBO related inversely with the number of riparian states. SADCC was also considered by some of the riparian states to be ineffective, but this was partly due to the fact that reconciling different national agendas was a daunting task when national agendas were given precedence over regional ones (see Scarritt & Nkiwane 1996). In addition, limited capacity and funding inadequacies coupled with a lack of authority at supranational level – as characterised by most regional economic communities in Africa – is not a formula for successful programme implementation (The World Bank 2010).

Since the action plan for the environmentally sound management of the common Zambezi River System (ZACPLAN) was a brain child of UNEP, the institutional character of UNEP, its lack of funding and limited mandate hampered its capability to influence the progress in the basin beyond the initial signing of the agreement. Most probably, if UNEP had the same financial muscle and influence as the World Bank and its role in the Indus, or UNDP and its role in the Mekong River Basin, progress would have been different due to the availability of incentives to the riparian states in the form of finances (Dinar et al. 2007). UNEP could not successfully overcome the political and economic barriers to the adoption and implementation of the ZACPLAN because of its limited capacity. This may also explain why the ZACPLAN was suspended in 1991 and funds had to be sourced from the Nordic countries. Donors were also unwilling to support the process further as there was weak support to the process by the riparian states themselves, which limited donors' involvement as compared to other basins. The problem with the ZACPLAN was that it was also difficult for the riparian states to assess individual gains in this process due to the way it was structured, even though political will from the riparian governments is necessary to attain international cooperation (see Dinar et al. 2007). In addition, donor programmes in the basin were not coordinated as most of the donors were still working with the riparian states at bilateral level. This was challenging to the ZACPLAN process which aimed to harmonise water-related developments in the basin. Moreover, the bilateral nature of programme development between the riparian states and donors ran the risk of funding inefficiencies as a result of possible replications in donor funded programmes (see Chenje 2000).

4.6 The establishment of the Zambezi Watercourse Commission (ZAMCOM)

By the early 1990s, the ZACPLAN process was postponed due to the lack of a regional water policy to guide the ZACPLAN process[20]. As Nakayama noted, this was one of the key contributions of the ZACPLAN since its implementation was instrumental in the drafting of the SADC water protocol (Nakayama 1998). Nevertheless, this should also be understood in terms of the influence of the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil in 1992 which saw the proliferation of water treaties in the immediate post conference period (see Conca et al. 2003). The 1992 SADC Treaty made provisions on areas of cooperation and its article 21(3) identified seven main areas of international cooperation including cooperation over natural resources and environment. Article 22(1) of the same laid down the provision that "*member States shall conclude such protocols as may be necessary in each area of co-operation, which shall spell out the objectives and scope of, and institutional mechanisms for, co-operation and integration*" (SADC 1992: 10). Considering the need to develop an integrated water resources management plan for the Zambezi River Basin, the SADC Protocol on Shared Watercourse Systems was developed. The 1995 SADC water protocol was intended as a guiding instrument to water resources development in the whole of Southern Africa. The protocol was based on the 1966 Helsinki Rules and international law and adopted the use of a drainage basin (Salman 2001). The use of the term watercourse system in the protocol however raised some concerns about the conflicting nature of the two terms- *watercourse system* vs. *drainage basin* (Salman 2001: 317). Based on article 2(a) of the 1997 UN Convention on International watercourses, a watercourse system is defined as "a system of surface waters and ground waters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus" (UN 1997: 3). In contrast, the definition of international drainage basin as provided by article II of the Helsinki rules is "a geographical area extending over two or more states determined by the watershed limits of a system of waters, including surface and underground waters, flowing into a common terminus" (ILA 1967: 1). The definition of the drainage basin seems

[20] ZAMCOM webpage on the history of ZAMCOM

therefore to conceptually include land and water resources to which some states (across the globe) objected as it would impact the regulation of both land and water resources in riparian states (see McCaffrey 2007). The SADC water protocol was signed on 23 August 1995 by the ten governments of Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe (The World Bank 2010; Salman 2001). The protocol recommended that each river basin develop its own specific water resources management plan.

The 1995 SADC Protocol on Shared Watercourse Systems placed significant emphasis on the institutionalisation of river basin organisations. *Article 3* of the protocol made provisions on the establishment of the river basin management institutions; *article 4* made provisions on the objectives of the river basin management institutions; *article 5* made provisions on the functions of the river basin management institutions; and article 6 made provisions on the financial and regulatory framework for river basin management institutions (SADC 1995, Salman 2001). The protocol was ratified in 1998 and entered into force on 29 September of the same year (The World Bank 2010; Salman 2001).

When the ZACPLAN process resumed in 1998, the government of Zambia withdrew from the process citing that it was in the process of reforming its national policies and legislature. As a result, negotiations on the agreement to establish the Zambezi Watercourse Commission (ZAMCOM) were terminated (World Bank 2010). Additionally, as a result of the 1997 United Nation Convention on the Non-Navigational Uses of International Watercourses and concerns raised by some of the SADC member states regarding the 1995 SADC water protocol, the SADC member states started revising the 1995 water protocol. A revised water protocol was signed in August 2000 and was ratified in 2003 (ZAMCOM webpage; Salman 2001). Some notable changes in the revised protocol were the adoption of the principles of equitable utilisation and no significant harm from the 1997 UN Convention (Salman 2001).

Several river basin organisations have been set up in Southern Africa as a result of the SADC water protocol, including the Orange-Senqu River Commission in 2000, the Limpopo Watercourse Commission in 2003 and the conclusion of the agreement to establish the Zambezi Watercourse Commission in 2004 that was ratified in 2011 (see also Dombrowsky 2007).

The changing ideas of water over the years also influenced how the Zambezi Basin was perceived and planned for management. The increasing promotion of integrated water resources management as well as river basin management as progressive ways of managing water resources (see Dombrowsky 2007) influenced how treaties were designed in the basin. The 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa identified water resources management as one of the conditions to achieving sustainable development (Rahaman & Varis 2005). The summit recommended the development of IWRM and efficiency plans in river basins by the year 2005 (see Dombrowsky 2007; Varis et al. 2008). Also important to note is that river basin management as a concept encourages the establishment of river basin organisations such as ZAMCOM for the specific management of the river basin (Dombrowsky 2007).

When the riparian states signed an agreement on 13 July 2004 at Kasane in Botswana to establish the Zambezi Watercourse Commission (ZAMCOM), the key focus was to establish a legal institution that would guide water resources management in the basin. The government of Zambia was the only riparian state not to sign the agreement on the same basis that it was undergoing policy and legislature reviews (The World Bank 2010). Nonetheless, conclusion of an agreement that does not cover all the basin states is not in itself unique since the majority of treaties in international river basins do not cover all the riparian states (see Conca et al. 2003; Turton 2008). Even the Zambezi River Authority, operating on behalf of the governments of Zambia and Zimbabwe has its mandates reduced to only the Zambezi River main channel and excludes the tributaries (see WCD 2000b; Santa Clara 2000). Moreover, the mandate of ZRA is also highly sectoral and not integrated as its focus is mainly the Kariba Dam management for power production for the two states (see Mukosa 2000: 86). For instance, the Zambezi River Authority Act's article three specifically mentions water for hydropower and only makes provision for other uses that the two governments may decide upon (FAO 1997). This signifies the complexity of reaching an international agreement as the number of riparian states increases (Turton 2008).

The ZAMCOM agreement reflects what is provided in both the 2000 SADC Revised Protocol on shared watercourse systems and the 1997 UN Convention as these two institutions are clearly referred to in the preamble of the agreement. This contrasts with reviews of water treaties around the globe, where according to Giordano & Wolf, there is little reliance on generalised principles of the international watercourse law in designing basin specific treaties (Giordano & Wolf 2003: 78). Conca et al. (2003) suggest that while the UN Convention through the ILC broke new ground with the principles of equitable use and avoiding significant harm, their penetration in basic specific treaties was still limited. They further argue that environmental protection seems to be the exception as it has been readily included in basin agreements at an increased rate. Nevertheless, they attribute this trend to environmental activism and growing environmental concerns rather than purely on its codification by the Convention (Conca et al. 2003).

Through the ZAMCOM agreement, treaty members commit themselves to the "realization of the principles of equitable and reasonable utilization as well as the efficient management and sustainable development of the Zambezi Watercourse" (SADC 2004: 2). This commitment is the main aim of the Zambezi River Commission (SADC 2004). Article 5 stipulates the objectives and functions of the Commission and article 5(b) centres on the promotion, support, coordination and harmonisation functions of the ZAMCOM in order to manage and develop water resources of the

Zambezi watercourse. Article 5(c) stipulates the advising role of the ZAMCOM to the basin states "on the planning, management, utilization, development, protection and conservation of the Zambezi Watercourse as well as on the role and position of the Public with regard to such activities and the possible impact thereof on social and cultural heritage matters" (SADC 2004: 4).

The SADC Water Division, as an overseeing agent for the ZACPLAN, launched in 2001 the second phase of ZACPro 6 when the ZACPLAN process was revived in October that year. This phase was expected to last eight years, from 2001 to 2009, and intended to develop an IRWM strategy (ZAMSTRAT) for the Zambezi River Basin. Furthermore, the goal of ZACPro 6 II was to "set up regional and national enabling environment necessary for strategic water resources management through ZAMCOM" as well as "establishing water resources management systems including models , tools and guidelines" (The World Bank 2010: 159). The Nordic Governments of Denmark, Norway and Sweden financed phase two of ZACPro 6 and activities were carried out by the Zambezi River Authority under the guidance of the SADC Water Division (The World Bank 2010). When phase two of ZACPro 6 came to an end on 30 April 2009, ZAMCOM which was expected to operationalise the ZAMSTRAT, was yet to be ratified and instead an interim ZAMCOM secretariat was adopted by the Ministers responsible for Water from the riparian states (The World Bank 2010). The ZAMCOM agreement was finally ratified in June 2011 when six of the eight states ratified the agreement.

4.7 ZAMCOM: The way forward

On 29 May 2013, at Luanda Angola, Zambia, the only non-signatory to ZAMCOM, announced its intentions to become party to the agreement when the Council of Ministers met (Zamcom webpage). This was historical as it brought to an end almost 15 years of Zambia's non-participation in the ZACPLAN process, highlighting further the difficulties of concluding a water treaty in large and complex basins. In mid-2013, Zambia ratified the treaty effectively becoming the seventh member of ZAMCOM[21]. Oftentimes, arguments have been put forward to stipulate that the higher the number of riparian states, the more challenging it is to conclude a water treaty in an international river basin. The work by Conca et al. (2003) seems to support this position. For this particular reason, some scholars suggest that sub-basin agreements are much more desirable (see Dinar et al. 2007). These scholars have in this line of argument advocated partial agreements to overcome the challenges of formulating a basin-wide agreement (Varis et al. 2008). Just and Netanyahu also state that as the number of members increase in multilateral organisations, its performance seems to decrease (see Dinar et al. 2007). While the ratification of ZAMCOM may be regarded as a milestone in the basin, and it is, based on the difficulties of establishing a basin-wide agreement in large and complex basins, the 15 year period of the non-participation of Zambia would have posed challenges to the successful implementation of the IWRM strategy for the Zambezi Basin, and important lessons need to be drawn.

River basin organisations such as ZAMCOM are set up to promote integrated water resources management as well as enhance cooperation among the riparian states (see Dombrowsky 2007). The withdrawal of participation from the ZACPLAN process as well as the subsequent withdrawal from signing the ZAMCOM agreement by the government of Zambia had implications for ZAMCOM in executing its mandate. If we consider the definition of IWRM as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP 2002 op.cit Dombrowsky 2007: 8), it is best applied at basin level.

[21] According to the International Environmental Agreements, Zambia signed the ZAMCOM treaty in 2013. Malawi remains the only state yet to ratify the treaty. Available at: http://iea.uoregon.edu/page.php?query=membership_long_form&mitch_id=4450&membership_format=action

Integrated water resources management particularly at basin level, while desirable, is challenging because of the complexity involved in bringing all the issues and all the riparian states to the table. Furthermore, effective implementation of integrated water resources management is challenged by asymmetric power relations existing in each particular basin (Allan & Mirumachi 2010). Dombrowsky breaks down IWRM into three levels encompassing: firstly, basin wide management; secondly, integration of various uses of water and their respective sectors; and thirdly, the establishment of a river basin organisation to manage water development (Dombrowsky 2007). While basin-wide management and RBO are an important part of IWRM, it is important to note that when it comes to monitoring and enforcement mechanisms by an international river basin organisation, its ability to carry out supervision with regards to the same may be limited due to sovereignty issues embedded in the state (see Dombrowsky 2007; Varis et al. 2008).

Why did the government of Zambia withdraw from the ZACPLAN process when it was an instrumental party in the process from its inception? It has been argued that states have both individual and collective interests when joining international organisations (see Dombrowsky 2007). Political solidarity or stability could be part of the collective interests that riparian states seek when joining international organisations. Nonetheless, overlooking water needs for political gains does not offer a solid ground for water management (Green Cross International 2000). Individually, states are more likely to join international organisations if they meet their national goals. This is where the assessment of incentives available to various states in the basin matters. Where incentives are clear to the riparians, cooperation may be established or enhanced (Wolf 1998).

In terms of basin geography, Zambia is better placed in the basin to carry out significant unilateral water development efforts. The geographic advantage or power in this case lies with Zambia. In consideration of water resources development potential, Zambia holds the greatest hydropower potential, even though some of this potential is shared with Zimbabwe, as a great length of the Zambezi River lies in Zambia. Only around 1,660 MW of hydro-electric power was developed in Zambia by the year 2000 (Chenje 2000). This implies that the Zambian Government is more flexible and has more opportunities to carry out projects with few limitations. The incentives to participate in regional organisations such as the ZAMCOM are therefore limited in the absence of any purposeful restructuring of individual states' incentives through issue-linkage or side payments.

Collective interests have played a crucial role in ratcheting up cooperation especially at basin level but also interestingly in some cases at bilateral level within the Zambezi River Basin. The case of Zambia and Zimbabwe in light of the proposed Batoka Gorge project provides an interesting case. Hydropower development has been central to the development plans of the Zambian Government. This is also true for several of the Zambezi River Basin governments as part of their economic and social development efforts since late colonial times (see Kalapula 1989: 57). Nevertheless, most of the riparian states have lacked the financial capability to develop the available hydropower potential.

The Zambezi River main channel forms the border between Zambia and Zimbabwe, especially in the mid-section of the river. As a contiguous river in this section, no single state can develop it without involving the other because of issues of reciprocity and partial internalisation of externalities. Importantly, all the hydropower potential for Zimbabwe lies on the Zambezi River main channel. In contrast, Zambia has hydropower potential on many of its tributaries including the Kafue and Luangwa Rivers. This means that while Zambia can afford to delay developments on the main Zambezi River channel as it develops other tributaries, the Zimbabwean Government has no such luxury as its hydropower potential is limited to the main channel itself

(Chenje 2000). Thus incentives may need to be restructured here to secure the participation of Zambia in the development of the Zambezi River's main channel.

The bilateral agreement to develop the Batoka Gorge[22] for hydro-electric power at the beginning of the 1990s between the governments of Zimbabwe and Zambia was thus largely dictated by political interests. A comprehensive feasibility study on the development of the Batoka hydro-electric power scheme was commissioned in 1991 whose reported was submitted to the Zambezi River Authority in 1993 (Mukosa 2000). In terms of energy production, Zambia was already generating excess power in the 1980s, particularly after the decline of the copper industry and in the face of rapid deindustrialisation (see Scarritt & Nkiwane 1996). Moreover, the Zambian Government was suffering from a negative balance of payments and simultaneously implementing structural adjustment programmes, such that its economic capability was limited to participation in the proposed development of the Batoka Gorge. Yet, for political interests, the government of Zambia signed an agreement with the government of Zimbabwe and the Zambezi River Authority in 1990 to develop the Batoka Hydropower Project (Scarritt & Nkiwane 1996). The agreement was also established on the back of disagreements on how share benefits from the Central Africa Power Corporation, a joint venture of the two states (Scudder 2000). The Zambian government increasingly became less forthcoming on the Batoka Gorge project (Scudder 2000).

For the government of Zimbabwe, the proposed development of the Batoka Gorge hydropower project was economically justifiable. The economy was growing (even though there were signs of slowing down in the late 1980s), and Zimbabwe was importing part of its electricity from Zambia. Thus projects like the Batoka Gorge HEP were well positioned to make Zimbabwe energy self-reliant, a goal that has been at the

[22] The Batoka Gorge is located around 400 km upstream of the Kariba Gorge and 54 km downstream of the Victoria Falls (see Tumbare & Tsokodayi 2000: 116).

heart of the Zimbabwean administration since the time of independence (Scarritt & Nkiwane 1996). As for Zambia, its political differences with the government of South Africa meant that Zimbabwe was important for the consumption of its excess energy production. Without the Zimbabwean Government taking up excess electricity, the Zambian Government could have faced a loss of financial revenue (see Scarritt & Nkiwane 1996). Moreover, the SADCC region had excess supply of electricity which was worsened by energy self-sufficient policies by the member states. This suggested that energy trading, even though part of the SADCC agreement, was limited outside South Africa. Thus there were no real incentives for the government of Zambia to participate in the Batoka Gorge Hydropower project during this period. Changes at the beginning of the 1990s might have forced the government of Zambia to pull out from the Batoka Gorge and cited lack of economic incentives for Zambia in addition to possible environmental consequences associated with its development (Scarritt & Nkiwane 1996). Furthermore, unresolved issues concerning debt repayment on the Kariba Dam stalled any possibility of developing this joint venture (The World Bank webpage).

The high levels of inactivity in the water and energy sector in the Zambezi River Basin have been caused by weak economic activities in most of the riparian states as well as lack of access to developmental funds for infrastructural development. The increasing participation of China and its enterprises in the Zambian economy for instance has somehow enhanced the capability of the government of Zambia to exploit its water resources. In this context, the conclusion of the SADC protocol on shared watercourse systems on 23 August 1995 might have forced the Zambian Government to reflect on how such institutions will impact its efforts to stimulate national development. Institutions such as the ZAMCOM imply that some of the national interests have to be ceded in favour of regional interests. The withdrawal of Zambia from the ZACPLAN process as well as ZAMCOM agreement might have been undertaken to advance its national interests. This is based on the fact that the government of Zambia has generally preferred bilateral agreements since achieving multilateral consensus is most often complex and time-consuming (Scarritt & Nkiwane 1996). The ZAMCOM may have thus been viewed in this way and the Zambian Government did not want to be constricted too much in its development agenda by a third party institution.

Zambia is naturally endowed with water resources. With the rainfall in the basin influenced by the ITCZ, the northern parts of the basin experience two rainfall maxima, corresponding to the downward and upward movement of the ITCZ (Mazvidza, Sakala & Mukupe 2000). Zambia contributes around 42 per cent of the Zambezi River flow, making it an important riparian state hydrologically (see Sustersic 2007). In addition, runoff in the Zambian part of the basin is only second to Mozambique (see Tumbare 2004). However, the difference between the two countries is that for Mozambique, as a downstream country, a bigger proportion of its runoff is constituted of exogenous water, which makes the country vulnerable, while Zambia relies largely on endogenous water resources. Using Gleick's analogy, the vulnerability of a state in international river basin consists of four factors which include water supply and demand ratio, available water per capita, percentage of exogenous water and composition of hydropower in overall water uses (Gleick 1993). For Mozambique, at least two factors are met: the percentage of exogenous water and composition of hydropower in overall water use. This means that water resources development activities in Zambia can have a significant impact on Mozambique, while technically the reverse is largely impossible in the physical sense. Newspaper reports and other unofficial communications suggest that Zambia pulled out of the negotiations over ZAMCOM because the process failed to take into account each state's hydrologic contribution to the basin in the agreement. Due to the fact that Zambia has the largest share of the basin and is a major contributor to the Zambezi River waters, agreements that failed to allocate water accordingly were perceived as working to the disadvantage of Zambia (Chanda 2004; Zambian Watchdog 2010). Nonetheless, while both Mozambique and Zambia possess huge irrigation potential, the strong consideration for hydropower may limit Zambia's capacity to develop it since hydropower development places restrictions on withdrawals in the upstream (see

World Bank 2008). This very important characteristic helps to allay potential conflicts arising from Zambia's increased use of water for agriculture development since its strong focus on hydro-electric power promotes self-moderation.

The longest course of the Zambezi River main channel lies on the border between several states with the exception of the part that lies in Mozambique and a small section at the headwaters of the river in Zambia and Angola. This means that no development can ensue on these sections without seeking the mutual cooperation of the bordering riparian state. The Zambezi River main channel lies on the border between Zambia and some parts of Angola and Mozambique and entirely with Botswana, Namibia and Zimbabwe. The flexibility of the various states to develop the Zambezi River waters unilaterally without the involvement of the government of Zambia is therefore limited. Zambia in this way possesses attributes to become a key hydropolitical player in the basin (Turton 1997). Experience from Southern Africa has shown that the states in several river basins have refrained from developing contiguous parts of international rivers. This development can be explained from the way riparian states treat contiguous rivers since no state can unilaterally develop the waters without involving the other states. Any attempt to harm the other state may be equally reciprocated by the other state.

China's participation particularly in the mining sector has largely impacted Zambia in two ways: an increased level of economic activities in the country thereby necessitating further investments in energy resources development, particularly hydro-electric power; and also an increase in Zambia's overall capacity for infrastructural development. On this front, China has increasingly provided loans to the government of Zambia in excess of two billion US Dollars to undertake hydropower development. Because Zambia has a good number of endogenous water resources, it was in its interest to develop them speedily to address its energy requirements without being limited by the river basin organisation's institutional mandates.

The government of Zambia has developed ambitious master plans to develop both its water and energy resources. Channelling these efforts through ZAMCOM can be time-consuming and challenging to its development agenda. The problem with third party institutions is that some riparian states may not fully support them if they perceive that the general position on a particular issue is in line with the position of another riparian state. Besides, many countries, just as might be the case of Zambia, prefer to solve water-related issues on bilateral or multilateral terms rather than being constrained by international norms or third party institutions (see Biswas 2008). With the geographic power firmly in Zambia's hands, the state could proceed to develop those resources that lie solely within its borders unilaterally and leave any developments on the main channel to the time-consuming process of international hydro-politics. Notably, even in this area, Zambia has the edge as the other riparian states cannot advance with the development of those resources without the participation of the government of Zambia. This means that if the other states are hard pressed to develop water resources from those sections, incentives have to be restructured through issue-linkage or side payments to bring the government of Zambia on board. As previously discussed, the failed plans for the Batoka Gorge Hydro-electric Power Project are good evidence of Zambia's important role in the basin.

The Zambian Government can also use ideational powers when it comes to water resources development in the basin. Tributaries of the Zambezi River from Zimbabwe have been heavily regulated for agricultural, domestic and industrial purposes. Most of those regulation works were carried out in the colonial era (Sustersic 2007). However the rivers are regulated such that for Zimbabwe, substantial water engineering works can only be carried out on the main channel itself. Here, the government of Zambia may equally argue that it has the right to develop its tributaries as much as Zimbabwe has done with its tributaries.

With the strategic advantage resting in the hands of the Zambian Government, the ZAMCOM secretariat might have indeed faced some challenges in executing its mandate, if Zambia was still a non-party to the treaty. It nonetheless casts a shadow of doubt on treaty compliance in the future particularly if some states will regard ZAMCOM as too restrictive of their development agendas. It is not known whether the ratification of the treaty by Zambia implies that its geographic and hydrologic concerns with the treaty have been addressed. While participation in water management by all riparian states is encouraged, international watercourse law in its current form does not require riparian states to establish basin-wide agreements embedded in river basin management (Dombrowsky 2007). For this particular reason, ZAMCOM might have been limited in carrying out its functions particularly as it relates to article 5(b) and (c) of the ZAMCOM agreement with the non-participation of Zambia. Zambia might have continued with its water resources development unilaterally as long as it did not contravene international watercourse law, particularly article 5(1) and article 7(1) that deal with the principles of equitable utilisation and obligation not to cause significant harm. Article 5(1) of the 1997 UN Convention states that:

"*Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse*"

and article 7(1) states that

"*Watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States*" (UN 2005: 4-5).

Article 6 of the convention specifies conditions that should guide states to determine the equitable utilisation of an international watercourse (UN 1997). The convention recently entered into force on 17 August 2014, 14 years beyond the deadline of 2000. By 2009, only 18 countries had ratified the convention (McIntyre 2010: 66) and by the end of 2012, the number of ratifications was still short of the 35 required for the treaty to enter into force. So far, Namibia is the only country from the Zambezi Basin that has ratified the treaty. South Africa's ratification of the treaty brings the number of ratifications to two if the whole SADC region is considered[23]. It should also be noted that the 1997 UN convention has been used in cases to resolve water related disagreements between states even before the Convention was ratified. McIntyre presents the *Gabčikovo- Nagymaros* case where the International Court of Justice made a ruling with reference to the UN Convention (McIntyre 2010). This bodes closely with the principle of equitable utilisation which is enshrined in the UN Convention and has been central in many of the international agreements regarding the management of international waters i.e. Helsinki Rules on the Waters of International Rivers (see McIntyre 2010). This means that even if Zambia had remained a non-party to the ZAMCOM agreement and proceeded to develop its waters unilaterally, and if there arose any grievances from the other basin states, the 1997 UN Convention might have been used by the International Court of Justice or other international tribunals to settle disputes. Moreover, article 12 of international water legislation also requires states to make prior notification where planned water use may have detrimental effects on another state (see Dombrowsky 2007). This means that there still has to be some level of cooperation, whether only at the level of information sharing, regardless of whether a state is or not party to an agreement or treaty. In other words, the provision for prior notification in international watercourse law moderates the geographic power of the riparian states in the absence of a treaty or where some members are not party to an existing treaty.

[23] Treaty ratification documnet number XXVII. UN

Reliable and up-to-date data on key variables such as hydrologic, climatic, economic etc. in the Zambezi Basin states is central to sharing water equitably (see Wolf et al. 2003). This is particularly true when considering that reasonable and equitable utilisation should be seen as a process as riparian states continuously adjust to natural and anthropogenic changes (see McCaffrey 2007). What is currently equitable and reasonable might not be so in the future, and as such riparian states are supposed to periodically review water use patterns and change accordingly. Nonetheless, doing so requires riparian states to work closely together and exchange information and the process is most successful when such cooperation is formalised through a treaty. Moreover, when dealing with issues of harm, a state would be in a difficult position to assess whether its use of water that causes harm to another state is legally permitted. This is because within international watercourse law and actual state practice, the no-harm principle is not rigidly applied i.e. it is "an obligation of conduct, not an obligation of result" (McCaffrey 2007: 134, 365). This suggests that a number of factors have to be considered in order to assess whether the state causing harm has taken all necessary measures to avoid causing harm. This in turn suggests that up-to-date information is critical in order to make such assessments, and requires exchange of information by the states and their close cooperation. Currently, there is still some work to be done in the Zambezi River basin in order to attain reliable and up-to-date data that can be used as a basis for sharing water equitably and resolving any potential disputes. Though desirable, exchange of information is also problematic as a result of the states' fear of it being used strategically by other states, and also its critical role in unilateral decisions and maintenance of asymmetric powers (see Dombrowsky 2007). The underlying argument is that access to data and information is important in the bargaining process aiming to influence 'political agenda or just at the bargaining table' which may work against the state with strategic advantage in the basin (see Cascão & Zeitoun 2010. 36). Zambia already expressed concerns about the security of information sharing. Nonetheless, without the full participation of Zambia, coupled with the lack of access to reliable and up-to-date data from the basin states, suspicions could easily rise, particularly where other states felt that they were receiving a raw deal.

The non-participation of Zambia would have been problematic for ZAMCOM since one of the reasons for establishing cooperative arrangements is to gain mutual trust through information sharing. Exchange of information and data is also critical in the negotiation process for international water management (Dombrowsky 2007). For Zambia, information sharing might not have been mandatory if the agreement was not signed and for such reasons had the potential to generate misunderstandings and mistrust among some of the ZAMCOM members. This could be problematic as Elhance argues that mere perceptions of misuse of the shared water resources by a particular riparian state may heighten conflict, especially when water resources increasingly become scarce (see Dinar et al. 2007). Moreover, in order to promote the sharing of benefits other than water itself, access to information is crucial to allay fears of cheating and increase mutual trust. Where also side payments have to be considered in order to address asymmetries and negative externalities, it is crucial for the riparian states to have complete information as well as having well-defined property rights as Durth argues (Dombrowsky 2007). International watercourse law also places an obligation on states to share data and information, as conveyed in article 9 (Dombrowsky 2007). Thus information exchange may facilitate the establishment of an "equitable regime" in the spirit of equitable utilisation of international waters as provided by international watercourse law (McIntyre 2010: 69).

4.8 Summary

Collective interests such as pan-Africanism, decolonisation and the fight against the apartheid regime have in the past facilitated cooperation on international waters in the basin. This has been problematic in the sense that such processes have been overly political with less consideration for geographic and hydrologic characteristics of the basin, where the individual interests of the riparian states may lie. What this means is that such processes have failed to recognise different incentives and interests available to different basin states as a result of geographic asymmetries, and therefore the need to restructure those incentives through components of strategic interaction in order to ratchet up cooperation in the basin. The changing political configuration in the basin and Southern Africa as a whole from the 1990s evidently affected the ZACPLAN process, thereby exposing the inherent problem of predominantly political processes in international water management.

The changing political configuration coupled with the need to set up guidelines to the establishment of a river basin organization in the Zambezi Basin led SADC to the establishment of the 1995 SADC Protocol on shared watercourse systems. This development has been considered as one of the key achievements of the ZACPLAN. However, the revision of the 1995 SADC water protocol in addition to the adoption of main principles of the 1997 UN Convention, has resulted in generalised agreements in the SADC. The generalised nature of the water treaties in the Zambezi Basin, in attempt to align them to the 1997 UN Convention, implied that basin specific processes were not addressed such as basin configuration, the way the water moves, asymmetries, as well as the different incentives and interests of the states. The pull out of Zambia might have been a result of the reflection on the potential implications of the agreed principles on its water resources development efforts, especially in consideration of its hydro-geography and the flexibility it has to develop such resources. However, this development had some implications on the operationalisation of the Zambezi Watercourse Commission. Here there is need to recognise and address geographic asymmetries and restructure incentives accordingly to promote international cooperation. Construction projects at bilateral or multilateral level may be key to increased cooperation particularly where side payments and other issue-linkages are addressed especially in hydropower projects. Moreover, depending on water uses, the geographic advantage may shift from state to state. In the current situation where the government of Zambia holds the geographic advantage, failure to move in this direction offers no real incentives for it to be party to the ZAMCOM.

Since information sharing is critical for the establishment of an equitable regime in international watercourses and for dealing with the issues of harm, the participation of the government of Zambia is important. This is so, because information sharing is facilitated when treaties are formalised. The non-participation of Zambia implied that more effort might have been spent on resolving potential conflicts other than on the prevention and implementation of projects that increase mutual gains. Nonetheless, to achieve treaty compliance in the future, ZAMCOM agreement needs to tackle some specific issues that are of prime concern to Zambia or ZAMCOM has to lead the process of identifying and facilitating joint projects between states so that issues of rights and responsibility of states are well clarified. Moreover, when ZAMCOM leads such processes, the process may avoid the risk of overlooking basin-wide implications of proposed projects as has been the case with the Zambezi River Authority.

While joint projects may unlock the potential for enhanced cooperation in the basin, what is evidently true is that different economic capacities and varied social and developmental conditions as well as goals among the basin states set limitations on the capacity to plan and implement programmes jointly. This implies that there is chance to let national priorities take precedence until a problem emerges. This may defeat the purpose for which the Zambezi Watercourse Commission was instituted. If ZAMCOM lacks total commitment and support from its members, its capacity to execute its mandate may be limited. The full commitment to the process by the states may only arise if the cooperative gains for each member state are greater than the cost of non-cooperation i.e. developing water resources unilaterally. The development of new hydro-electric power plants present an important opportunity for the basin states to enhance cooperation not only in such projects but other water uses as well due to the demands hydropower developments place on the water system. If new projects involve investments from multiple basin states, the basin will truly be viewed as a unitary whole where the sum of its parts is greater than the whole. However, that may require attitude change with regards to energy self- sufficiency that has hindered power development in the region.

The agreement to establish a river basin organisation in the Zambezi River Basin and to manage waters in the basin in a coordinated fashion has been long and protracted. Nevertheless, it is yet to be seen whether there has been a shift from a multinational perspective to an international perspective of the basin among the basin states and key players in the basin. A basin-wide management plan (ZAMSTRAT) certainly exists as well as a river basin organisation, ZAMCOM. However, a lack of joint programmes challenges the assessments on national policy shifts in relation to the ZAMSTRAT and the ZAMCOM. For Selby, an interaction or institution may only be considered cooperation if a process of policy coordination exists; if all parties to an agreement adjust their policies to an agreed policy coordination; and finally if the outcomes from the interaction or institution are mutually beneficial (Selby 2013). The implementation of the ZAMSTRAT by ZAMCOM on behalf of the riparian states should therefore be assessed in this light. In terms of the future outlook, it is difficult to determine the progress of ZAMCOM since it has only become operational in 2014. Furthermore, since there is a provision for opting out of the commission, one wonders what will happen if a faster way to achieve progress for most of the basin states is found outside ZAMCOM. While basin-wide cooperation is important, economists argue that a riparian state's participation in an international river organisation will depend on the costs of its participation in comparison to non-participation, and for this reason basin-wide management cannot be adopted as a universal principle (Dombrowsky 2007).

Chapter five

The Zambezi River Basin in the contemporary times

In the past five decades, since the earliest states were granted independence, the Zambezi River Basin states have experienced significant changes in political configuration, economic performance and actors both at regional and global levels. Furthermore, climate has increased in uncertainty while legal instruments to guide the management of international waters have been drafted and ratified. What this chapter aims to analyse are the implications of these various changes for the basin states in their efforts to develop international waters, particularly with regards to whether the states have made policy adjustments at national level to align national strategies to basin-wide strategies. Key also to this analysis is whether geographic asymmetries have been acknowledged in treaty formation and how they have been addressed.

5.1 Current issues

The overall environment in which international water management is currently drafted and executed in the Zambezi River Basin differs from the era when the first international hydro-projects were executed. Since that time, important transitions have taken place in the basin and the wider region of Southern Africa as a whole. Treaties are now entered into by full sovereign powers, contrary to when colonial powers signed treaties on behalf of the peoples of the colonies in the mid-twentieth century (SADCC 1980; SADC 1992; SADC 1995; SADC 2004). This is also mirrored in key project areas where riparian states have obtained total or majority shares of the projects i.e. the Kariba project where a representative of the CDC sat on the board of the ZRA until an outstanding loan on the Kariba HEP project was settled, and the Cahora Bassa Dam where the government of Mozambique obtained majority shares from Portugal through a 700 million US Dollars pay-out. Moreover, the end of frequent and violent conflicts that characterised the basin in the 1970s and 1980s has ushered the region into an era of regional peace and stability (Chenje 2000). Over a decade into the twenty-first century, the central focus in regional cooperation is no longer on liberation efforts, as evidenced from the SADC agreement (SADC 1992). The states now have a genuine opportunity to cooperate on different fronts to spearhead social and economic development in the region. Particularly since the 1980s, numerous agreements on issues ranging from water resources management to energy development and others have been signed that aim to increase regional and sub-regional cooperation and interdependence among the states.

Broadly speaking, the world has become increasingly globalised which has created different opportunities and challenges for various countries and regions of the world. To this end, several analysts have highlighted how the globalisation process has marginalised many of the African states (Poku & Edge 2001). The architects of the regional treaties in Southern Africa and the Zambezi River Basin consequently argue that the regional states have a better chance of maximising gains and weathering the force of globalisation through regional cooperation. Confronting the world as a region enhances the chances of making the most of globalisation, as opposed to individual states that have less diversified economies (see Taylor 2003). Consequently, several treaties have been drafted in response, and aim to improve the economies and social-economic conditions of the people of Southern Africa.

Climate change and the role of humans have also become central issues in global discourses and policy considerations for most of the governments, multilateral institutions and supranational organisations. There is now an increasing focus to adopt technologies that reduce emission of greenhouses gases attributed to global warming, such as those under the Clean Development Mechanism, where hydropower is a great contributor (see Kumar et al. 2011). For this particular reason, hydropower development which has been contentious in the past decades on the account of its environmental consequences is receiving increasing attention from governments and international financial institutions in an effort to combat climate change (see Kumar et al. 2011). Between 2003 and 2015, the World Bank Group has contributed more than USD 9.2 Billion Dollars to the installation or restoration of hydropower projects with an installed capacity of 16 GW (The World Bank, online).This shift in perception has implications for the energy sector which has been in an underdeveloped state in the Zambezi River Basin and Africa in general (with underdeveloped technical potential in the range of 92 per cent) due largely to limited financing of hydropower projects (see Kumar et al. 2011, AfDB 2011). A positive outlook on hydropower projects, of course being mindful of social and environmental impacts, may facilitate acquisition of funds thereby spurring new developments. Nevertheless, hydropower development places considerable stress on the entire water system, as minimum flows have to be established for optimum level performance of the hydropower plants (Norconsult 2003). At the same time, most basin states are experiencing increased economic activities which have elevated water demands and abstractions. In the face of increasing climatic uncertainties, escalated water demands can lead to strained relations between the riparian states if they cannot find mutual ways of cooperating (Kumar et al. 2011). The agreement to establish the Zambezi Watercourse Commission (ZAMCOM) secretariat was recently ratified with the expectation that water resources in the basin will be developed in an integrated and coordinated manner, which can be quintessential to managing the impacts of climatic change (see ZAMCOM online).

Importantly, the world also witnessed the end of the Cold War at the close of the twentieth century. The end of cold war has been associated with a decreased risk of conflict (see Gleditsch et al. 2004) of which some basin states experienced as a result of the east-west divide. Since the demise of the Soviet Union and the consequent ending of the Cold War, the United States emerged as the only superpower, thus the triumphant establishment of the Washington Consensus. However, in recent times, China has emerged as an economic superpower in its own right and is effectively challenging the dominance of the Washington Consensus. This emerging dualism has implications on how the countries in the third world approach their development agendas. This is primarily due to the alternative arrangement in which China is engaging with the African countries. The African states, through cooperation with China, have gained access to new sources of funding which has enabled them to reconsider how they tackle development projects, particularly those that have regional implications as in international water resources.

In the context of all these important changes that have taken place at various spatial scales, the basin states face numerous opportunities and challenges that will influence how they participate in both the regional and global political-economy, whether collectively as a region or individually as sovereign states. At the same time, some developments will also challenge the institutions that have been set up to manage international water resources such as ZAMCOM. It is for these reasons that this chapter aims to explore how the combined changes of regionalisation, climate change and the emergence of China will influence water resources development in the Zambezi River Basin. South Africa will certainly have an important role to play in shaping the energy sector in the SADC (Mbirimi 2010: v) as well as the Zambezi River Basin. Nevertheless, the rapid pace at which China is transacting business with Africa and its active involvement in key sectors in some of the Zambezi Basin riparian states warrants more attention in this chapter.

While the chapter aims to refine discussion to the implications of the new forces in the Zambezi River Basin, most of the discussion takes place at the SADC level. The reason is simple since energy trading in the region is transacted through the Southern Africa Power Pool which consists of all the twelve mainland SADC states. Moreover, changes in policies in the Republic of South Africa in terms of its energy sector will have important implications for developments in the Zambezi River Basin as well as the Congo River Basin. Unravelling the labyrinth of complex relationships between the social, political and economic factors while superimposing them on the geographic, climatic and hydrologic attributes of the basin is therefore key to understanding the significance of the emerging forces on current and future water developments in the Zambezi River Basin.

5.2 The State of the energy sector in Southern Africa

In order to appreciate the importance of the changes in climate, politics, economics, society and others on international water management through energy development, there is a need firstly to look at the state of the energy sector in Southern Africa. This is necessary in order to thoroughly explore the opportunities and potential challenges involved in water resources management in the basin as the basin states move in to develop their hydropower and irrigation potential.

The world at large relies heavily on fossil fuels to meet its energy demands. With more than 80 per cent of the world's energy supply coming from fossil fuels, hydropower constitutes only a small percentage of the world's energy supply (IHA[24] et al. 2000; Scudder 2005). Globally, hydropower contributes around 16 per cent of the power supply (Hamududu & Killingtveit 2012; Kumar et al. 2011). These global figures are also representative of the situation in Southern Africa, where hydropower only contributed 21.2 per cent of the energy mix by 2013/14 (refer to figure 6). Southern Africa has an installed electricity capacity of 58,387 MW of which 40,491 MW is from the thermal-based coal fired power plants. Of this, a total of 44,170 MW or around 76 per cent of capacity is installed in South Africa, comprising only 5 per cent of hydro-electric power (SAPP 2014). There are no hydropower projects in Botswana, while in Zimbabwe, a higher percentage of installed capacity comes from thermal power sources (AfDB 2011). Hydro-electric power on the other hand is predominant in the states north of the Zambezi River (Mkhwanazi 2003; Akapelwa 1996). In

[24] Paper by International Hydropower Association (IHA), International Commission on Large Dams, International Agreement on Hydropower Technologies and Programmes/International Energy Agency & Canadian Hydropower Association

Malawi, Mozambique, Lesotho, Zambia and the Democratic Republic of Congo, hydropower constitutes over 90 per cent of installed capacity, while in Angola 66 per cent of installed capacity comes from hydropower sources (SAPP 2014). In Tanzania, 717 MW of the installed electricity capacity of 1380 MW comes from hydropower sources (SAPP 2014).

This regional configuration of Southern Africa in terms of energy sources is a consequence of historical economic activities, technological capacities, geography and hydrology. Currently, industrialisation is concentrated in the water-constrained states located south of the Zambezi River, consequentially creating a mismatch between water supply and demand in the region (SADC 2005; see also Swatuk & Vale 2001). Greater mining prospects in the south of the Zambezi attracted the early European settlers who judiciously focused on mining as one of their core economic activities. Energy intensive economies therefore emerged as a consequence of this economic engagement. Coal-based thermal power plants progressively became an integral part of these economies as they were rapidly developed to meet high energy demands in both the mining and manufacturing sectors at a relatively lower cost (Marquard 2006; ECA 2009; Eberhard 2007). In the areas north of the Zambezi River, coal-based thermal power plants, though limited in scale, were initially developed to meet the energy demands of the emerging industries. One particular example is the copper industry in Zambia where coal was imported from the Wankie Colliery in Southern Rhodesia to power the copper belt.

Technology / Utility	SAPP UTILITY GENERATION MIX , MW												Total
	BPC	EDM	ENE	ESCOM	Eskom	LEC	NamPower	SEC	SNEL	TANESCO	ZESA	ZESCO	
Base Load Hydro	-	2,157	1,346	350	2,000	72	348	61	2,442	717	750	2,118	12,361
Coal	732	-	492	-	37,831	-	132	9	-	-	1,295	-	40,491
Nuclear	-	-	-	-	1,930	-	-	-	-	-	-	-	1,930
CCGT	-	-	190	1	-	-	-	-	-	585	-	-	776
Distillate	160	151	-	-	2,409	-	21	-	-	78	-	10	2,829
Total	892	2,308	2,028	351	44,170	72	501	70	2,442	1,380	2,045	2,128	58,387

Technology / Utility	SAPP UTILITY GENERATION MIX , %												Total
	BPC	EDM	ENE	ESCOM	Eskom	LEC	NamPower	SEC	SNEL	TANESCO	ZESA	ZESCO	
Base Load Hydro	0%	93%	66%	100%	5%	100%	69%	87%	100%	52%	37%	100%	21.2%
Coal	82%	0%	24%	0%	86%	0%	26%	13%	0%	0%	63%	0%	69.3%
Nuclear	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	3.3%
CCGT	0%	0%	9%	0%	0%	0%	0%	0%	0%	42%	0%	0%	1.3%
Distillate	18%	7%	0%	0%	5%	0%	4%	0%	0%	6%	0%	0%	4.8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 7. Power Generation and mix 2013/14.
(SAPP 2014)

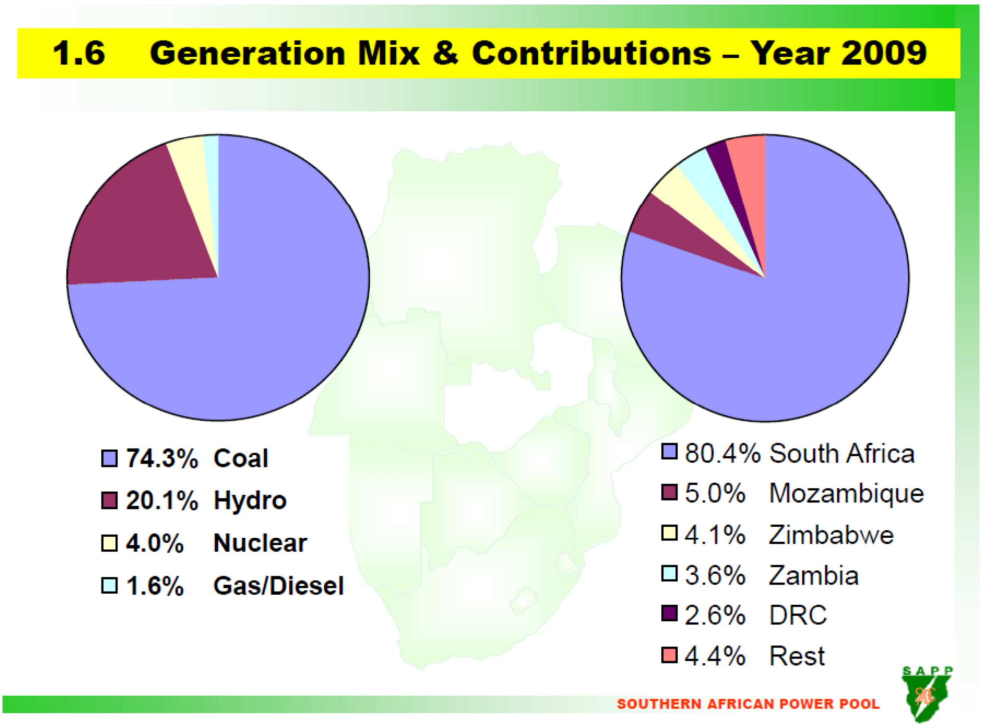

Figure 8. Energy composition mix in Southern Africa (SAPP)

5.3 Challenges to hydropower development in the Zambezi River Basin

Although high hydropower potential exists in the Zambezi River Basin, most of it has remained largely untapped. From the basin's estimated hydropower potential of around 20,000 MW, around 13,000 MW has been mapped so far and only around 4,684 MW has been developed (Chenje 2000). While the Zambezi River carries more than 10 times the water of the Orange River, water resources in the Zambezi Basin are largely underdeveloped (Swatuk & Vale 2001). The reasons for this limited development are multiple and complex. The most pressing challenge to the states in the Zambezi Basin has been lack of capital investments to develop hydropower (see Kumar et al. 2011). Hydropower development is both a capital-intensive and technologically challenging enterprise with long gestation periods. These characteristics have in many ways posed challenges to attracting private capital (IHA et al. 2000; Kumar et al. 2011; Taulo et al. 2015), especially crucial now that the governments are expected to reduce public expenditure.

Thermal power plants are on the contrary cheaper to install and are often approved in relatively shorter periods of time. Nonetheless, the running costs may be higher (see AfDB 2011, Williams 1984). While the low cost of generating electricity can offset the high capital costs in hydropower developments (IHA et al. 2000), often times investors are looking for investment opportunities where they can realise their money in a relatively short period of time (see Kumar et al. 2011). This may tilt the balance in favour of coal-fired power plants for the private investors. Besides, the private capital market in Southern Africa, just like in many developing countries, is also constrained. Foreign direct investments are therefore vital for any significant investment in the energy sector (Vedavalli 2007). This implies that the probability of hydropower development remaining a public entity is high. Unless the governments in the basin actively engage donors and international financial institutions for financing, hydropower development will still remain in its underdeveloped state. Due to a multiplicity of reasons, the success rates for the basin states to secure capital for such projects have so far been modest (see ICA 2011).

Hydropower development as an undertaking is also geologically dependent, limiting where such developments can take place (see Kumar et al. 2011; AfDB 2011; see also chapter 3). The history of the Zambezi shows that greatest hydro-electric power potential exists in the countries which have either been in violent conflict in the recent past or have weak regulatory and legal frameworks (ECA 2009). This phenomenon has worked to the disadvantage of the power sector development in the hydro-based north. The debate surrounding the real benefits of hydropower developments in consideration of its social and environmental implications has also worked in disfavour of such projects. The end result has been significant challenges to raise capital as negative publicity associated mainly with large dams and environmental activism put a lot of pressure on donors interested in financing hydropower projects (see Scudder 2005). In addition, hydropower projects create new hydrological realities as flow regimes are altered particularly where water is stored behind dams (Kumar et al. 2011). Such hydrological changes may have international implications where water is internationally shared. These hydrologic changes and changing geographies as a result of dams for hydropower also importantly necessitate long and complicated negotiations between riparian states themselves as well as between riparian states and donors, which have disfavoured hydropower projects when it comes to private capital (see Kumar et al. 2011).

Within the Zambezi River Basin, limited industrial development in the north of the Zambezi River has limited justification for such high cost investments in the past. Considering also that great hydropower potential in the Zambezi Basin exists in countries where internal demand was limited in the past, development became complex because of the need for power interconnections. Peak load in Mozambique for instance was around 200 MW in the year 2000 when the country had an installed hydro-electric power capacity of 2,075 MW at the Cahora Bassa Dam (Chenje 2000). In comparison, the peak power demand in Zimbabwe during the same period was 2,000 MW more than half of the volume that had to be imported (Chenje 2000). Considering the nationalistic sentiments that most of the basin states harboured in their quest for national energy security, developing more potential in either Mozambique or Zambia was therefore unjustifiable. There were of course a number of reasons why energy self-reliance became a predominant policy of choice for the basin states, as the violent conflicts and destabilisation activities in some key states reduced the feasibility of regional grids and power interconnections. Nevertheless, where such interconnections existed, electricity continued to flow unimpeded by destabilization activities, with the exception of the DC line connecting Mozambique and South Africa (ECA 2009).

In a bid to improve their economic situation, the basin states adopted the World Bank and IMF backed structural adjustment programmes (SAPs). Through the SAPs, the basin states aimed to create an enabling environment to attract foreign direct investments, reduce foreign debt by cutting down public expenditure, and improve market competitiveness and sector efficiencies by introducing market liberalisation and privatisation of public utilities (Easterly 2003; Logan & Mangisteab 1993). These principles were also extended to the energy and water sectors which were hampered by the lack of new investments and aging infrastructure.

However, the adoption of the Washington Consensus has not resulted in increased investments in the energy sector (Vedavalli 2007). Instead, the IMF and World Bank backed structural adjustment programmes of the 1980s and 1990s led to slowed growth, deindustrialisation and disinvestment in some cases as these countries failed to compete with the developed economies (Chenje 2000). This effectively eroded the financial capability of the countries in the Zambezi Basin, particularly north of the Zambezi to engage in large-scale economic and development projects. The declining economic activities in those countries also decreased demand for such resources as energy and water for the industries, and therefore slowed the need for further investments, particularly in the energy sector. Difficulties in carrying out structural reforms have also left the countries in the Zambezi Basin and indeed the whole of Southern Africa with a “hybrid market” because of the transformation processes that have not fully materialised (Mbirimi 2010: vi). This strong link between the state and energy utilities can also be found in the original SAPP agreement where membership was initially restricted to the power utilities belonging to the state in each SAPP member country (SAPP 1997). This requirement was only revised in February 2006 to include other actors in the energy market (Hammons 2011). Consequently, no significant investments have been made in capital-intensive hydropower development since the 1970s (see also Hammons 2011).

The lack of private participation in the energy sector has been attributed mainly to two factors. Firstly, the basin states continue to offer electricity tariffs that are not cost-reflective (AfDB 2011; Hammons 2011; Mbirimi 2010; Government of Zimbabwe 2011; Mkhwanazi 2003). This market characteristic contradicts the central tenet of development where a market-led economy is a key to achieving economic growth and private sector participation. The problem with non-cost-reflective tariffs is that they erode the financial capacity of the energy utilities to make new investments as well as rehabilitate aging infrastructure (Edkins et al. 2010; Government of Zimbabwe 2008). This has been evident in the Zimbabwean situation where due to under-pricing of tariffs, the Zimbabwe Electricity Supply Authority (ZESA) accumulated a huge debt preventing it from securing further electricity imports from Mozambique’s Cahora Bassa Dam in early 2000 (see Chenje 2000; see also AfDB 2011).

By failing to recoup costs, the power utilities rely on government subventions which have proved to be unsustainable. This effectively places most of the energy utilities under government control either as public enterprises or as parastatal companies. More importantly, most of the plants continue to run below optimum level. In 2014, when the installed capacity in Southern Africa was 58,387 MW, only around 52,543 MW was available (SAPP 2014). This represented 87 per cent of the total installed capacity meaning that 13 per cent of the energy capacity in the region was unavailable when it would have otherwise been utilised to reduce power outages in many parts of the region. In Malawi, the available electricity capacity has been recently around 80 per cent of the total installed capacity, while in Zimbabwe has been between 60 and 70 per cent (Gamula et al. 2013; AfDB 2011). The situation is worse in the Democratic Republic of Congo (which ideally is supposed to power the African continent) where available power is almost half of the installed capacity.

Nonetheless, the increase of electricity tariffs to reflect true market value as recently expressed by the Government of Botswana[25] has inflationary consequences and may impair the attractiveness of the region for investments in the energy-intensive enterprises. SADC through its regional water policy intends to provide cheap hydro-electric power (SADC 2005). One of the core objectives of the SAPP is also to attract energy-intensive users into the basin such as those in mining and manufacturing and as such high energy costs may deter potential investors.

The second important barrier to private participation in the energy sector has been poor or lack of existing regulatory and legal frameworks both at national and regional levels (see AfDB 2011; Bhagavan 1985; Hammons 2009; Mbirimi 2010; see also SADC 2005a). Clear and concise legal and regulatory frameworks are important for private investors because they reduce uncertainties and minimise the risks involved in investments in projects with long repayment periods (Mbirimi 2010). In the absence of new investments, power utilities in most of the basins are incapable of supplying adequate and reliable energy and this hinders the provision of energy for development. This increases the inability of the basin states to overcome some key challenges to

[25] Sunday Standard Online Edition, Botswana. 17 March 2013

social and economic development in the basin (see AfDB 2011). Nonetheless, there are some new developments that may change the overall energy outlook in the region, and in order to analyse some of the potential drivers of change in water resources development in the basin, the discussion turn its focus to power interconnections and climate change issues.

5.4 Regional Grids, Power Interconnections and Climate Change Considerations

When the Southern Africa Power Pool[26] (SAPP) was established in 1995 through an Intergovernmental Memorandum of Understanding in line with the SADC Treaty, the aim was to "provide reliable and economical electricity" to the participating countries of the power pool (SAPP 1997: 2-3). The operationalisation of the SAPP is guided by four important legal documents which include: a. the *inter-governmental memorandum of understanding (IGMOU)* that permits the governments to participate in the power pool; b. *inter-utility memorandum of understanding (IUMOU)* signed by energy utilities in the SAPP member countries, c. *agreement between operating members (ABOM)* laying down operational procedures for those members whose utilities are interconnected, d. *Operating guidelines* specifying cost sharing and other functional responsibilities (SAPP 1995-1997:2-4; SAPP online). The SAPP has twelve member countries that include Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Out of these, Angola, Malawi and Tanzania are non-operating members since their grids are not yet connected to the regional grid (SAPP 1997; SAPP 2014).

The severe drought at the beginning of the 1990s exposed the vulnerability of hydropower projects in the basin to climate change and the limitations of national energy self-sufficiency (SAPP 1997). The recorded lowest water levels for Lake Kariba were obtained in December 1992 at 475.91 metres since the lake reached its full supply level in September 1963. This was barely half a metre above the dam's

[26] SAPP was the first power pool to be established outside Western Europe and North Africa (Mbirimi 2010)

minimum operating level of 475.5 m (see Kaluba & Mukupe 2000). On the other hand, the highest recorded water levels for Lake Kariba before the turn of the century were obtained in 1982/1983 at 487 metres, slightly below the dam's maximum retention level of 488.5 metres (Mukono & Mulendema 2000; Kaluba & Mukupe 2000).

Considering that the climate in the basin continues to exhibit erratic trends, the need to cushion against effects of sustained periods of drought on energy generation is higher. This also forms part of the core objective of the SAPP IGMOU (Hammons 2011). Power interconnection and a regional grid was therefore envisioned as a means to increase security and reliability of power supply, as well as increasing the efficiency of energy use through complimenting demand curves by balancing up demand and supply at regional level (see SAPP 1997). The 2010 Multi-Sector Investment Opportunity Analysis study by the World Bank revealed that through joint cooperation of the hydro-electric power plants in the Zambezi River Basin, firm energy can actually be increased even in the absence of new investments (World Bank 2010a). This increases the economies of scale in the basin and the region.

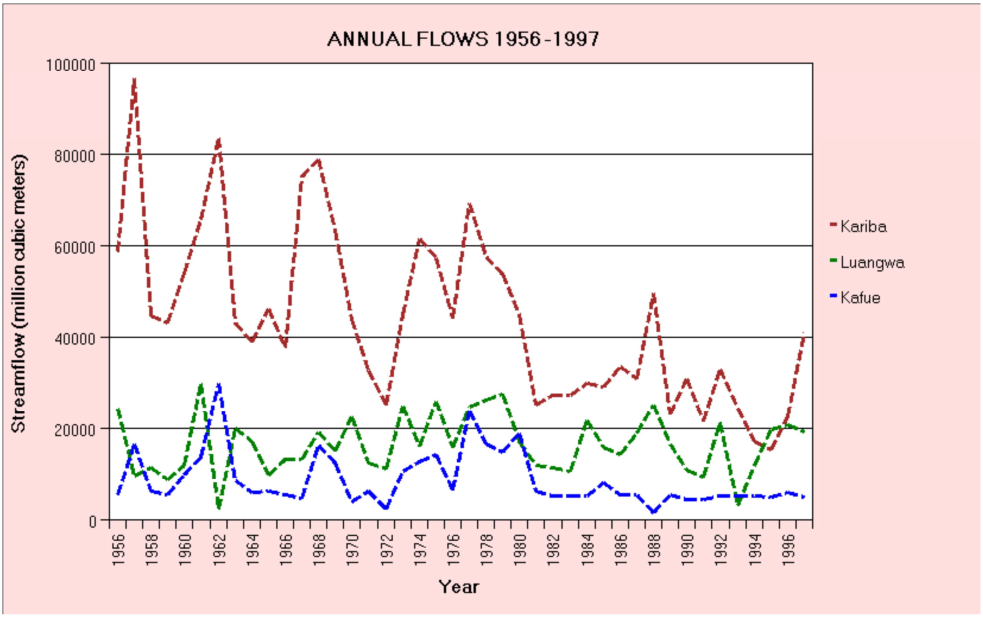

Figure 9. Annual Flows for Lake Kariba, Kafue and Luangwa from 1956 to 1997 (SWRSD[27] 2011: 29).

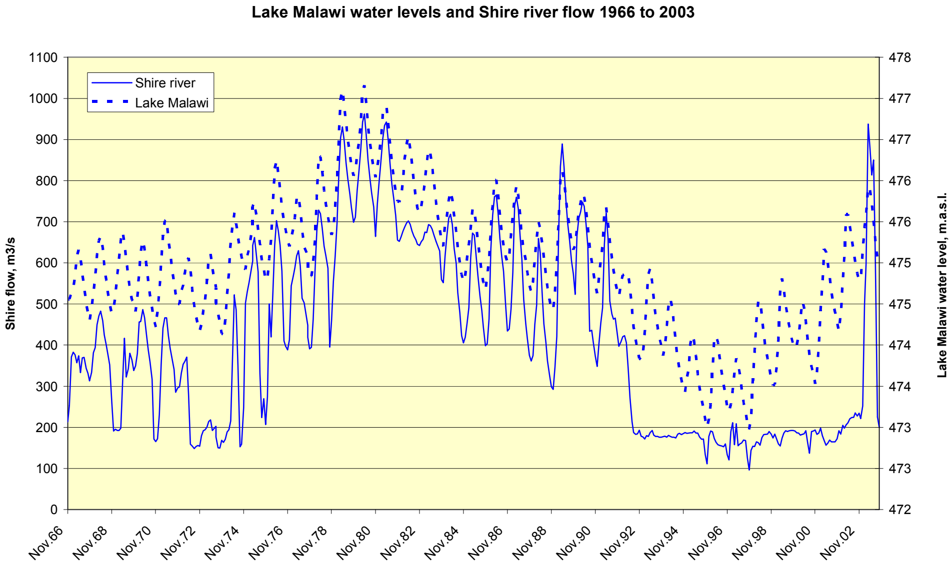

Figure 10. Lake Malawi water levels and Shire River flows, 1966 – 2002 (Norconsult 2003)

More precisely, power interconnections and regional grids increase energy security for countries that have no internal capacity while at the same time enabling the development of hydropower projects in countries where internal demand is limited to justify such projects. The ability to secure high capital investments may also be improved in regional power pools where a single country is financially limited to develop a potential site. Pooling resources from various regional members may ultimately increase cooperation and interdependence among the states (see Kumar et al. 2011).

[27] SWRSD Zambezi Basin Joint Venture

Power interconnection in Southern Africa dates back to the 1950s when the copper belt in Zambia was supplied with power from the Democratic Republic of Congo in 1958 (SAPP 1997). The Kariba Hydro-electric Power Project also interconnected Zambia with Zimbabwe in 1960, (which has become the backbone of SAPP (SAPP 1997), while the Cahora Bassa Project interconnected Mozambique with South Africa in the mid-1970s (see chapter three). When the Southern Africa Development Coordinating Conference was established in 1980, one of the core objectives was to increase interdependence among the Southern African states as a means to reduce their dependence on the apartheid South Africa (SADCC 1980). The 1982 declaration "Towards an Energy Policy for Southern Africa" signed in June 1982 by the Council of Ministers of the SADCC member countries intended to improve the energy situation in the member states (Bhagavan 1985). This declaration aimed to, among other things, exploit hydropower resources both small and large as a strategy to promote rural electrification as well as develop regional electrification. It also envisaged power interconnection of the national grids as an efficient means to produce and distribute electricity (Bhagavan 1985: 215).

The idea to promote power interconnection and regional grids was however problematic during the 1970s and 1980s in the Zambezi River Basin as well as the SADCC region. Opportunities to cooperate effectively over a wide range of issues were limited by violent conflicts and destabilisation activities prevalent in the region. Energy infrastructure, dams, substations, transmission lines – because of their vulnerability – became a constant target for both military and economic attack (Munslow & O'Keefe 1984). Malawi and Zimbabwe particularly faced chronic fuel shortages due to their dependence on supply lines in Mozambique, as RENAMO guerrillas persistently attacked railway lines and supply chains (Bhagavan 1985; Munslow & O'Keefe 1984). The DC line between Cahora Bassa and Apollo Station in South Africa was also repeatedly sabotaged in the early 1980s, making it hard for the government of Mozambique to acquire foreign exchange earnings through power exports (Isaacman & Isaacman 2013: Munslow & O'Keefe 1984). This line was only repaired and put to use in 1998 after being inoperative for 17 years (Hammons 2011; ECA 2009). These developments implied that pursuing further economic connections through power interconnections would just increase the vulnerability of any state to external factors. Of course, politics of self-reliance should also be considered since excess power at the beginning of the 1980s could not be fully utilized by countries like Zimbabwe when Mozambique generated excess at Cahora Bassa, enough to meet the demand in Zimbabwe (Williams 1984).

South Africa as the main player in the SAPP[28] can influence how the Zambezi Basin progresses in the future, since policy shifts in the energy sector in that country have wider implications for the development of the SAPP. This is particularly true now as the global community increases its focus on climate change and the contribution of greenhouse gases to such changes. As the world's appreciation of the changing global environment intensifies, there is greater emphasis on the utilisation of green energy sources in order to combat climate change (Kumar et al. 2011). There is thus an increasing focus on hydro-electric power projects which in the past have been criticised for their environmental consequences. These changes are also taking place in Southern Africa, particularly in South Africa (see Mbirimi 2010).

The Government of South Africa, as a signatory of the Kyoto Protocol on Climate Change, is determined to reduce its carbon footprint. In a presentation to the House of Parliament, Pravin Gordhan, the South African Government's Finance Minister stated that heavy carbon polluters will pay carbon tax from 2015 (Steyn 2013)[29]. The implication of the carbon tax is that coal-based thermal power, which has for a long time been supplied inexpensively to the South African industry will become expensive and allow electricity imports to become competitive. Eskom South Africa is the largest

[28] South Africa consumed around 84 per cent of total electricity in 2010 (ICA 2011)

[29] Mail & Guardian iPad edition, 1 to 7 March 2013. Story written by Lisa Steyn entitled "*We'll all pay the price for dirty power*"

contributor of greenhouse gases in South Africa due to its coal-based thermal power plants, accountable for around 54 per cent of the approximately 224 million tonnes of carbon di oxide emissions per annum (ECA 2009; Greenpeace 2012).

As of 2001, hydro-electric power only represented 1.2 per cent of South Africa's energy grid, where up to 93.2 per cent came from thermal power sources (Mukheibir 2007). As in 2013/14, the energy mix composed of 5 per cent hydropower and around 76 percent of thermal coal fired power (SAPP 2014). This predominantly coal-based energy mix in South Africa is attributed to the country's state owned enterprise ESKOM's ability to procure cheap coal resulting to low priced electricity (see Eberhard 2007; Marquard 2006) and in part to limited water resources which restricts its capacity to develop hydro-electric power projects. Eskom intends to substitute some of its high polluting thermal power plants and also meet increases in energy demand through cheap power imports from the hydro-based north (see ECA 2009). Moreover, the high cost of peak power in South Africa which is met by using pumped up storage plants rated at 1,400 MW and gas turbines can be better managed through cheap hydro-electric power imports (Akapelwa 1996). This means that those projects in the Zambezi River basin that were not viable due to lack of internal demand may be economically justifiable now i.e. the Cahora Bassa North power station and the Mphanda Mkuwa Power project in Mozambique. This is also one of the pillars of SAPP, where the utilities gain a broad based market through power interconnections, making economic justification of major projects much easier.

The energy mix in Southern Africa may enable the maximisation of energy use that is congruent with environmental sustainability. For instance, South Africa already purchases power from Zambia and the DRC to address peak power demand (Eberhard 2007). At the same time, it has the ability to provide better energy security to the participating states through employment of inherent advantages of both thermal-based and hydro-based electric power plants. If the overall carbon footprint in the SAPP is to be reduced, hydro-electric power and other green forms of energy have to constitute a higher percentage of the energy mix than at the current time, which as of 2009, was in the order of 74.3 % for coal, 20.1 % for hydro, 4 % for nuclear, and 1.6 % for gas and diesel (see ECA 2009). This is possible since hydropower projects have lower carbon footprints than their comparative coal-based thermal power plants. Research in both North America and Brazil has shown that greenhouse gas emissions from hydropower projects are considerably lower than in fossil fuel-based power stations (IHA et al. 2000).

While there are several competing green technologies that generate electricity, such as wind and solar, none of them is currently as expansive as hydropower (constituting 86 per cent of green technologies, even though down from 92 per cent in 2000), and for a good part, such technologies are currently utilised as complementary projects rather than standalone projects (Hamududu & KillingTveit 2012; IHA et al. 2000). Moreover, since most of those competing technologies are in their infancy, they are still expensive and their successful rollout will require government subsidies and strong policy support in the initial stages (Mbirimi 2010; GoM 2014). SAPP plans indicate significant changes in the energy mix in the region by 2025 with coal-based thermal power plants representing 56 %, hydropower, 26 % while seeing an increase in gas and diesel from 1.6 % to 22 % (ECA 2009). As of 2013/14, hydropower constituted 21.2 %, coal 69.3%, nuclear 3.3 %, and 6.1 % for gas and others (SAPP 2014).

The South African Government may be motivated by the need to reduce its carbon footprint and lower electricity tariffs when focusing on hydropower developments in the north. However, hydropower as a means of generating electricity has many advantages that thermal sources simply do not have. Some of those advantages of hydropower projects that are classified as ancillary benefits include spinning and non-spinning reserves. Hydropower plants on the account of their spinning and non-spinning reserve attributes are more suited to the provision of peak power where fossil fuels may be better suited for base loads (see Kumar et al. 2011). Spinning reserve is the energy that is available but not utilised in plants that are already connected to a system and this can be obtained by increasing the speed of the rotor to generate more electricity. This is important because it is achieved without the need for more input resources (IHA et al. 2000). Hydropower plants are for this particular reason able to meet peak power demands within as little as ten minutes upon request. Non-spinning reserves refer to the power that can be obtained from turbines that are part of the system but are currently not running and can be switched on when there is need to generate more electricity. Compared to other technologies, such as steam-based power production, hydro-electric power generation is able to supply power upon request relatively quickly where steam can take up to several hours before electricity is supplied. This means that hydropower plants are better suited to respond to variable demand curves in real time than other forms of power generation (Kumar et al. 2011). Furthermore, by increasing power output either through spinning or non-spinning reserves, GHG emissions per KW hour of electricity falls while the opposite would be true with fossil fuel-based systems.

Hydropower plants, unlike other electricity generating technologies, do not need auxiliary power to start up the system. As the IHA et al. report points out, those systems that have hydropower plants as part of their energy mix are able to power up quickly if the system was shut down for some reason (IHA et al. 2000). This flexibility for hydro-electric power generation makes it well suited to power trading, particularly the short-term arrangement where power can be purchased as need arises. As the SAPP transitions to a day-ahead market system of power trading (Hammons 2011), hydropower projects can meet the needs of power consumers much more efficiently than other power sources because of the flexibility of hydro-electric power generation.

Another major advantage with hydropower plants is that the cost of generating electricity is relatively low compared to coal-based thermal power plants (Kumar et al. 2011). Unlike coal, water is generally free and when it is sufficiently stored behind dams, power generation can be sustained for long periods of time regardless of the changes in seasonal flows (Kumar et al. 2011). For the SAPP region, this means that states relying on thermal power can afford to substitute their high generating costs with cheaper electricity imports from hydropower plants (World Bank 2007). In this way, besides the reduction in energy costs, carbon targets can be better met due to reduced levels of pollution as the coal power plants are switched off. History provides many examples on how this inherent advantage of hydropower plants has facilitated power supply in the Zambezi River Basin.

In the 1970s and 1980s, as the states switched from thermal sources of power to hydro-electric power, the cost per unit of electricity fell drastically. For a number of states, the reduction in cost was as high as a factor of five (Bhagavan 1985). The combined effects of the reduction in cost of generating electricity and increase in supply enabled the basin states to offer low electricity tariffs in order to entice bulk consumers (Bhagavan 1985). It was therefore economically inexplicable when the government of Zimbabwe decided to develop a coal-based thermal power plant which would have effectively increased the unit cost of electricity by 70 per cent (Bhagavan 1985). Moreover, power imports for Zimbabwe have proved to be more reliable than what Zimbabwe has managed to generate internally (ECA 2009). In recent times, the Zimbabwe Government with an installed capacity of 2,045 MW only has 1,080 MW of available power because of its inability to run thermal power plants due to the combined effects of dilapidated machinery and lack of capability to mine coal. In effect, the drive to develop the coal-based thermal plant in Zimbabwe in a bid to become self-sufficient has failed.

As water is rarely subjected to economic principles applicable to other resources (Coopey & Tvedt 2010), hydropower projects may not experience the same inflationary costs as in coal-based thermal power plants. Water moves along the landscape mainly driven by the natural law of gravity and as such its movement is not affected by world markets. This is not the case with coal, a resource that has to be mined and transported from one place to another. While capital requirements for coal-based thermal power plants may be lower than for comparatively sized hydropower projects, capital acquisition may also be needed for coal mining when internally available or for imports. Coal-based power generation may thus be considerably affected by disruptive prices on the world markets as any cost increases in the supply chain add on to the cost of generating electricity. Considering also that the longer the chain the higher the risks of disruption, disruptions in any part of this chain threaten the reliability of electricity generation.

Despite the numerous advantages of hydropower development, thermal power plants will continue to be a significant part of the energy mix both within the SAPP and the world in general. Even if all of the world's hydropower potential was to be developed, the total installed capacity would still not satisfy the energy demands of the world (IHA et al. 2000). The reality as such is that these two types of energy production will continue to run side by side with the possibility of greater variations in composition of the energy mix both within states and regions across the globe. A thermal-hydropower energy mix also importantly promotes energy security and use efficiency (see World Bank 2007).

Even though the development of hydropower sources is important to reduce emissions of greenhouse gases, there are also concerns regarding the reliability of these projects in the wake of increasing climate uncertainty (Kumar et al. 2011, Hamududu & Killingtveit 2012). While water is essential for cooling in thermal power plants, these plants are not as susceptible to climatic changes as hydropower. Although dams have been constructed at many sites to mitigate the impact of temporal changes in water availability, sustained periods of dry climate subsequently affect generation of hydro-electric power (Kumar et al. 2011; Hamududu & Killingtveit 2012). Energy banking may thus be one of the core advantages of a thermal-hydro energy mix (see Akapelwa 1996; World Bank 2007). When water is significantly reduced in the water system, states relying on hydropower projects may import electricity from thermal power sources. Whenever water levels become optimum again, states relying on thermal power sources may significantly substitute their high-cost, thermal-based electricity generation with electricity imports from hydropower plants (World Bank 2007). A thermal-hydropower mix can as such benefit all the users in different ways because of the inherent advantages of these two different types of energy generation. This is the very reason why cooperation and interdependence in the SADC region needs to be strong, beyond just formal agreements, because the resource imbalance that exists in the region promotes interdependence through power pooling.

In light of the advantages of the regional grids and power interconnections, as well as inherent benefits of a thermal-hydropower energy mix, Southern Africa has become increasingly interconnected. Since the advancements in transmission technology have also enabled power grids that span thousands of kilometres, the goal of the SAPP is to extend this grid even further by interconnecting to East Africa Power Pool as well. Eight key transmission projects pegged at a cost of 5.6 billion US Dollars were identified that aim to strengthen the grid and interconnect with the three remaining non-connected SAPP members (see also ECA 2009). These projects include the ZIZABONA grid line connecting Botswana, Namibia, Zambia and Zimbabwe, the Mozambique-Malawi interconnection, the Zambia-Tanzania interconnection, and the DRC-Angola interconnection (see map 2).

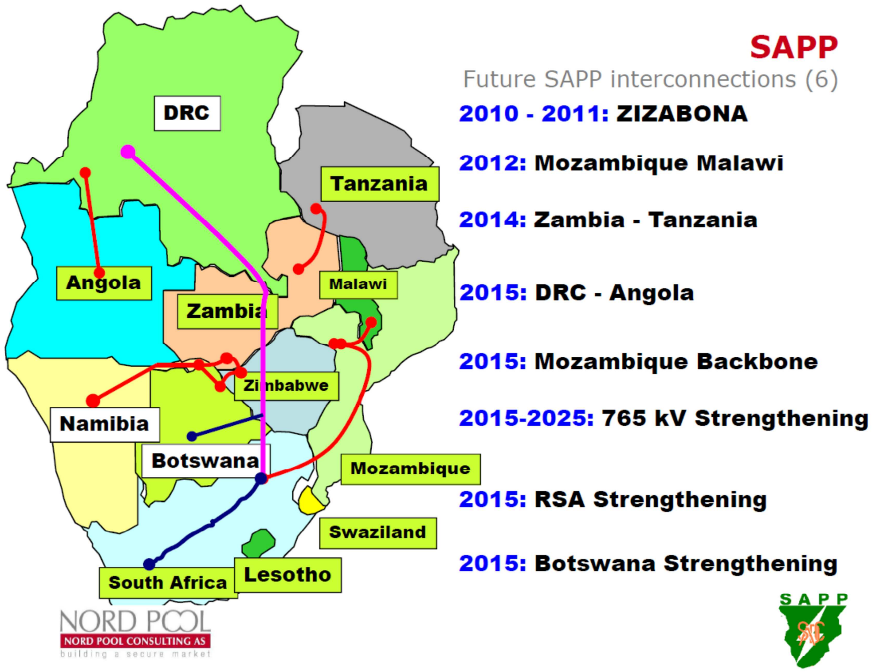

Figure 11. Planned power interconnection projects under SAPP

For some time, the focus of the government of South Africa has been on the Inga hydropower projects in the Democratic Republic of Congo, particularly the 3,500 MW Inga 3 project (see also ECA 2009), categorised as "presidential priority project of South Africa and the Democratic Republic of Congo"[30]. Transmission distances in the range of 3,000-6,000 km however may pose technical challenges to reliability as well as raise some security issues (Mbirimi 2010). The continued destabilisation in the DRC may also hamper project implementation. The 5,000 MW SAPP project entitled WESTCOR involving the governments of Namibia, Angola, DRC, Botswana and South Africa collapsed due to political uncertainties in the DRC (Mbirimi 2010). Recently, the SADC agreed to send a peace-keeping force to the eastern part of the DRC to quell rebel advancements. Troops from South Africa, Malawi and Tanzania

[30] Information posted on the International Rivers webpage on the Grand Inga Project in the DRC. Available at http://www.internationalrivers.org/campaigns/grand-inga-dam-dr-congo

were deployed in 2013 to the DRC as a preventive force. Nonetheless, the toppling of the government in March 2013 in the Central Africa Republic by the rebel movement "Sekele", where the South African Government had bilateral agreements with President Bozize, may force the South African Government to diversify its focus to other regions as well. This means that hydropower projects may be spearheaded in the Zambezi Basin, particularly in Mozambique, since initial developments in Zambia will be geared towards meeting internal demand for the foreseeable future.

Hydrological considerations may also be at the core of South Africa's preference for the DRC. Almost all climate change models show little change in rainfall patterns in high latitudes and wet tropics caused to climate change, implying that for long-term planning (see Hamududu & Killingtveit 2012), the DRC offers stability which is somewhat uncertain in the Zambezi River Basin. Water availability is likely expected to decrease in the Zambezi River Basin as climate changes and temperatures soar. This implies that hydropower projects may be negatively affected (see Kumar et al. 2011; Hamududu & Killingtveit 2012). Compounding these changes, there may also be water use changes as irrigation activities increase which will threaten the operational performance of the hydropower plants (Kumar et al. 2011). In addition, the hydropower potential in the DRC is huge as it is estimated at 40000 MW. Considering the high energy requirements in South Africa, the DRC is better suited to meet such requirements.

Under the current arrangement of the SAPP, and also in line with the SADC Regional Water Policy's increasing focus on hydropower developments, there is potential and an available market for hydro-electric power developments in the Zambezi Basin. However the costs of implementing the SAPP projects are enormous. While the SAPP is a regional institution, it lacks the mandate to lead planning and development of electricity generation plants. This has still to be directed by the states that intend to develop those resources. The efficiency to raise capital will thus be critical to the initiation of such projects. As previously stated, adoption of the structural adjustment programmes has not successfully attracted new investments for a number of reasons. If no new investments are made, the region will soon run out of energy reserves (established at 10 per cent above demand).

The rapid depletion of energy reserves at a regional level is increasing the vulnerability of the respective Zambezi River Basin states in their economic capacity to meet economic and social demands as evidenced by chronic power deficits in Zimbabwe (AfDB 2011). It is in light of this that the significance of the Chinese involvement in the energy sector can be explored. It is safe to state that the increasing involvement of China in the energy sector in certain countries may be pivotal to how the region develops in the future. Furthermore, the increased participation of China in the basin has significant consequences not only for the energy sector itself but also for international water management in general and the institutions mandated to coordinate water resources development in the basin and the region as a whole.

5.5 China in Africa

Why are the Chinese involved in hydropower development when traditional institutions like the World Bank increasingly reduce their part in this endeavour? Many authors have attempted to tackle this important question regarding the involvement of the Chinese in Africa in general. Consequently, a contentious debate has ensued on the motives of China behind its increased activities as well as the potential economic, political and environmental implications for such a level of involvement in the African continent. This debate has broadly categorised the Sino-Africa relations into three: China as a 'neo-colonialist'; China as Africa's 'development partner'; and China as a 'competitor' (Alden 2007: 5-6; Manji 2007: vii). The growing demand for oil and raw materials has often been argued as the driving force behind China's increased presence in Africa in its quest to fuel its growing economy as China strives to become a world economic power in its own right (see Alden 2007; Marks 2007; Rocha 2007; Mutesa 2010). Considering that the time is short (as it is only over a decade since China modified its relations with Africa to current arrangement) (Obiorah 2007), it is impossible to deduce with much certainty the nature of the emerging Sino-Africa relations from these recent interactions. There is a need however to diverge from the dominant analysis of the Sino-Africa relations at a continental level and instead streamline the focus to country-specific relations with China. Due to Africa's vastness and diversity, the subsequent nature of the Sino-Africa relations will be shaped differently according to the nature of a particular African country's political economy (Taylor 2009). Using this approach, it is possible to derive regional assessments from a specific country's close interaction with the other regional members.

China has presented itself to the African countries as a better alternative to the western world, including its Washington Consensus, through a different strategy of partnership. In a communiqué released at the 2006 China-Africa summit in Beijing, China and the African countries strive to work in 'a new type of strategic partnership founded on political equality and mutual trust, economic win-win cooperation and cultural exchange' (Marks 2007: 1-2; Cheru & Obi 2010: 5). Strong debates persist on the realities of these 'mutual benefits', but if we are to argue on the premise that there is indeed a win-win cooperation, the Zambezi River basin countries and indeed all African countries will have unique relationships with China. This should be expected since not all countries within the Zambezi Basin are equally endowed with natural resources. Furthermore, not all natural resources are of prime importance to China. It is therefore only realistic that Chinese activities will inevitably concentrate in some countries rather than others. As such there is a need to contextualise the implications of the increasing Chinese activities in the continent in relation to the international hydro-politics within the Zambezi River Basin. This is rather due to the fact that the preferred bilateral approach by China (Alden 2007), if not handled in terms of regional perspective by the host countries, has implications for regional cooperative efforts as well as joint water resources development initiatives in the basin.

The intensification of Chinese activities in Africa coincides with the intensified efforts by the Southern African governments to strengthen regional and sub-regional cooperation. In the recent past, the region has drafted instruments to improve water governance in the region, such as the SADC water protocol, and has established institutions such as the ZAMCOM, Zambezi River Authority and others. However, with the increasing involvement of China and its massive injection of FDIs, it is imperative to suppose that some of these instruments will be significantly challenged.

In a bid to promote regional cooperation over international waters, western donors have traditionally preferred to support environmentally related regional programmes rather than national programmes in international river basins. The World Bank for instance shifted its policy in the 1990s when it declared that only regional programmes in environmentally related projects would be supported (Poku & Edge 2001). Because the development of water resources in the basin has relied on access to grants and loans from Western donors, including multilateral institutions like the World Bank and International Monetary Fund (IMF), a shift to a regional focus aimed to increase cooperation among states when seeking funding. However, the challenges in reconciling national development plans and regional programmes complicated the means to secure capital funding by the Zambezi River Basin states. It is consequential to assume that unilateral projects would hardly receive any financial support from the World Bank as they would have been in contravention with the Bank's own guidelines. The expectation was that the riparian states would be encouraged to draft joint programmes thereby increasing regional cooperation and avoiding conflicts over international water resources in the process. However as observed in other basins like the Nile, such expectations have not really materialised.

The World Bank has also progressively become less involved in financing large dams. That has partly to do with the anti-dam movement led by vocal non-governmental organisations. Their lobbying at government headquarters but also at the Bank itself and other finance institutions has rendered major dams a contentious development proposition and increased the politicisation of participation in and financing of large dams. The International Rivers Network for instance "called for a moratorium on World Bank funding for large dams until inequities caused by previous ones had been corrected" (Scudder 2005: 267).

The Chinese involvement in Africa is as such significant because the Chinese government does not seem to strictly observe similar principles and protocols as followed by the west. In comparison to the numerous aid preconditions associated with western governments and financial institutions, Chinese loans come with limited conditions (Mutesa 2010). Unlike the west, Chinese loans may not require rigorous environmental assessments that are often the norm in projects supported by western governments or backed by the World Bank/IMF (Obiorah 2007). The implication of this is that the funding processes and project implementation may be easily facilitated in the Chinese backed projects. While this factor may play to the advantage of the African governments who have been financially limited in the past, the decreasing role of the World Bank in financing large dams partly as a result of pressure from the anti-dam movement, may lead to some negative developments in the environment and in the sound management of water resources (see Scudder 2005). Moreover, Chinese loans may not necessitate the need to carry out political reforms, a requirement at odds with many African leaders most of whom are not champions of democracy themselves (Obiorah 2007). After all, the story of the Chinese economic development in some ways refutes the notion that development is impossible in the absence of good democratic governance (Marks 2007).

China offered financial support to the government of Zambia at a total of 1 billion US Dollars for the development of the Kafue Gorge Lower Hydro-electric power project, on the condition that one of its State Owned Enterprises (SOEs) was awarded the contract (Lusaka Times 2011a). This provision seems to be the norm in the Chinese financed projects (Alden 2007). On the other hand, a 350 million US Dollar grant to the Malawi Government from the Millennium Challenge Account of the United States Government to develop its power sector provides a contrasting picture. This grant is awarded on the basis that the recipient government has demonstrated 'commitment to just and democratic governance, investments in the people of a country, and economic freedom' (Nyasa Times 2011). As of July 2011, the US Government withheld the grant due to a series of allegations of human rights abuse by the government of Malawi (Kasunda 2011). The grant was only resumed in June 2012 after a change of government following the death of the President of Malawi in April 2012 and subsequent reversal of some of the policies that angered Washington.

While China strives to engage Africa differently from the west, analyses indicate that China is not merely driven by political ideologies in its Africa policy (Alden 2007). This has been clearly demonstrated in its relationship with the government of Zimbabwe, since no considerable Chinese FDIs have been injected into that country after falling out with the Western governments and despite Zimbabwe's ruling elite touting China as a dependable ally (Obiorah 2007; Alden 2007). So far, Chinese aid seems to be concentrated in countries endowed with natural resources that are of interest to China and this has created unevenness in Chinese involvement in the Zambezi River Basin states. Consequently, different states in the basin will differ in their capability to mobilise financial resources for water resources development as China becomes a significant player in development aid.

The China-Zambia relations are given more attention in this chapter in order to explore the potential implications of the Chinese activities in Southern Africa involving international hydro-politics. The significance of Zambia in the Zambezi River Basin cannot be underrated because the combination of its geographical position and its hydrological contribution to the Zambezi River waters make its case interesting. Most of the important tributaries to the Zambezi River are solely located in Zambia. This geography affords Zambia the opportunity to exploit these waters somewhat unilaterally and therefore potentially influence hydro-political relations in the basin.

China has made huge foreign direct investments in the countries of Angola, Zambia and Mozambique within the Zambezi River Basin (Alden 2007; Rocha 2007). Coincidentally, these are also countries in the basin where water is relatively abundant (see Black & King 2009). Major FDIs in these particular countries signify greater potential to alter the waterscape in the basin with wider implications for the other basin states. In Zambia particularly, the Chinese FDIs were expected to reach around 2 billion US Dollars by the end of 2011 (Sinyangwe 28. Oct. 2011; Chisala 2011 29 October). This was the amount of capital that was generally invested in mining and manufacturing but also to a considerable extent in many other different sectors (Kragelund 2010). By 2006, there were 200 Chinese firms that had invested in Zambia (Kragelund 2010: 211). There are also direct Chinese involvements in the water and energy sectors through the Chinese Banks and engineering companies. In 2009, the China National Electric Equipment Corporation (CNEEC) signed a 669 million US Dollar Kalungwishi Hydropower Project with the government of Zambia (Sinomach 2010). In addition, the CNEEC and the Zambian public energy utility company, Zambia Electricity Supply Cooperation (ZESCO), signed letters of intent to develop the Lusiwasi and Lunzuwa Hydropower projects at a cost of 189.9 million US Dollars (Sinomach 2011). Currently, the 430 million US Dollar upgrade works at the Kariba North powerhouse to produce an additional 360 MW have been co-financed by the Chinese Government through the Ex-Im Bank of China and the Development Bank of Southern Africa (TradeInvest Africa 2010). All in all, China is injecting around 2 billion US Dollars into the energy sector of Zambia and this is vital for industrial activities in the country.

Increased industrial activities, improved living conditions, growing populations and general economic and social development are bound to exert pressure on water resources as demand increases. In recent years, Zambia has experienced positive economic growth since 1999 with the annual growth rate averaging around six per cent between 2006 and 2008 (Chubu 2010) and was expected to reach 7.5 per cent in 2013 IRENA 2013). The Zambian economy being copper driven (Poku 2001), the recent injection of Chinese capital to that sector has obviously contributed to the positive GDP growths recently enjoyed in the country. Zambia tops African copper production and production is set to peak 2 million tonnes a year by 2015 as per governmental targets (Katongo u.d.). Increased activities in the mining sector and manufacturing have created a surge in demand for electricity which has necessitated further developments in hydropower within Zambia. Although Zambia is well interconnected on the SAPP power grid, power imports to address supply deficits are currently not feasible as the SAPP lacks extra capacity (Chubu 2010; AfDB 2011) and the country is already experiencing supply deficit (IRENA 2013). SAPP's excess electricity supply which was in the order of 9,000 MW and concentrated mostly in Zambia, South Africa, DRC and Mozambique rapidly eroded to less than 1,000 MW between 1995 and 2009 (Akapelwa 1996; Hammons 2009). These figures may explain why SAPP's efforts initially concentrated significantly on energy trading rather than development.

The comprehensive Power System Development Master Plan (PSDMP) for Zambia intends to guide the development of a thermal-hydropower energy mix, although all the given scenarios are significantly hydropower based. The master plan has listed up to 18 potential hydropower projects, four of which are Run-off River projects that can be developed between 2013 and 2029 (Chubu 2010). The PSDMP also comprises four possible thermal power plants that can be developed within the same time frame. A total of 18 hydropower plants and one thermal power station may be developed between 2013 and 2029 under what is termed scenario 1-1 in the PSDMP, adding a total of 4,337 MW of installed capacity. On the other hand, a total of 15 hydropower stations and four thermal plants can be developed between 2013 and 2029 under what is termed scenario 1-2 in the PSDMP, adding a total of 4,111 MW of the total installed capacity (Chubu 2010). Whether all these power projects will be developed will depend on the availability of finances; 14 billion US Dollars in total (Chubu 2010), and also the future performance of the Zambian economy. Recently, the power demand changes in the SAPP may also take up excess supply which reduces the risks of investing in these projects based on the copper industry alone, which has suffered setbacks in the past. Thus the financial backing of the Chinese Government through its banks represents a major boost to energy development, a sector that has experienced limited developments in the past due to lack of financing.

Water resources will be vital for Zambia's energy development as the PSDMP importantly reveals. Even for thermal power plants where coal will be the main fuel for electricity generation, water will be essential for cooling the plants. By also considering that of the total 18 possible hydropower projects, only four are run-off-river projects, more water will have to be reserved behind dams to power those stations. The development of all the power generation projects will have a significant impact on water resources in Zambia as well as the Zambezi River Basin in general. Water losses due to evaporation will increase as hydropower projects currently account for around 10 per cent of water losses in the available water by evaporation (Chenje 2000). With further developments in hydropower projects, evaporation rates in the basin are only set to rise from current levels (see World Bank 2010a). As mining and manufacturing also increase, water demand will increase in these sectors either as an input or as a coolant. Growth in secondary sectors and general social development that may follow economic development will also lead to an increase in water demand since low economic and social development has limited demand in the past (see chapter 1). Energy and water demands are thus generally set to rise in Zambia by means of this increase in economic activities since the high proportion of people living in rural areas have reduced the demand for such services in the past (see Chenje 2000).

For China, there are derived benefits through its increased participation in the Zambian energy sector. By bankrolling activities in a foreign country like Zambia, China is actually enabling growth in its economy by expanding its investment base. After all, these are loans that the Zambian people have to service for some years to come. By tying Chinese loans to the Chinese State Owned Enterprises (SOEs) such as Sinohydro, the government of China is also providing new business opportunities for its enterprises and thereby spearheading development through expanded economic opportunities. Moreover, the increased participation of Chinese enterprises in these large-scale engineering projects provides the opportunity for the Chinese enterprises to demonstrate their technological prowess and gain the exposure they need to become prominent global forces. Specifically in Zambia, Chinese participation in the energy sector is also meant to ensure that Chinese mining activities are not constrained by lack of power. In most African countries where China has major interests and transactions, the Chinese Government has been involved in upgrading public infrastructure such as roads and port facilities in a bid to facilitate movement and export of commodities with eventual benefits for the African countries (Alden 2007; Rocha 2007).

5.6 Potential Implications for the Zambezi River Basin

Increased economic activities and the planned power projects in Zambia will undoubtedly alter the water budgets in the basin. Moreover, there are other outlined development initiatives in the rest of the basin states such as irrigation projects that will increase the basin-wide demand for water in the future (Heyns 2003). At the same time, climate change models have indicated a decline in future water resources availability to as much as a 25-40 per cent reduction in run-off as a result of warmer temperatures and around a 15 per cent reduction in rainfall (IPCC 2001; see also Kumar et al. 2011; Hamududu & Killingtveit 2012). Without harmonisation of new developments, water-related conflicts may surface in the future (Kumar et al. 2011). One of the most plausible approaches to avoid conflicts is to implement coordinated basin-wide integrated water resources development, already part of the ZAMSTRAT. Operationalisation may lead to increased coordination of water resources development whether at basin level or at sub-regional level. As the World Bank study's "A Multi-

Sector Investment Opportunities Analysis in the Zambezi River Basin" has indicated, cooperation particularly within hydropower and irrigation can significantly increase agricultural, economic and hydropower outputs (World Bank 2010a). Within the Zambezi Basin, cooperation on energy production has the ability to increase firm energy production by as much as seven per cent (World Bank 2010a). Even with no further investments in new hydropower generating plants, the current energy output can be increased to 24,397 GWH from 22,776 GWH (World Bank 2010a).

New economic and water development activities arising from regionalisation efforts, climate change and the Chinese finances importantly present the Zambezi Basin riparian states with new opportunities to place water as a key issue in international relations. Limited development of water resources amidst a host of social and economic problems has muted the seriousness of water resources as an international agenda in the past. This statement may seem to contradict all the international efforts that have taken place in the basin on water issues. However, if one considers the pace at which these processes have been undertaken and lack of willingness from the riparian states to finance such processes (Aasand et al. 1996), it may reflect how water issues have not been given the utmost urgency that they deserve. The ZACPLAN process took almost 17 years before the riparian states could finally agree to form the Zambezi River Commission. Signed in 2004 (the Zambezi 2004), it took another seven years before a two-thirds majority could ratify the agreement to establish the ZAMCOM secretariat. The interim secretariat of the ZAMCOM was solely financed by the Norwegian Government through its embassy in Lusaka, Zambia (SADC Water Sector: u.d.). Another factor complicating issues for the ZAMCOM treaty was the withdrawal of Zambia from the ZACPLAN and eventual non-participation in the ZAMCOM agreement, including its ratification. Even though the Zambia became party to ZAMCOM in mid-2013 the developments point to the need to promote joint development and management of projects to increase mutual gains and address different incentives and interests of the states.

Various water developments in the basin have the potential to affect water characteristics and use in various countries in the basin. How the states may cope with such changes will likely vary depending on the level of consumption in each riparian state, the technological capacity to utilise other sources of water as well as the quality of water available in each state (see Dinar et al. 2007). For instance, increased water utilization in Malawi cannot directly affect water availability in Zambia, Angola, Zimbabwe, Botswana and Namibia and vice versa since Malawi lies in the sub-basin of the Zambezi River in the lower section. Thus depending on which state induces changes in the hydrology of the Zambezi River, the effects on the other states will depend on their position in the basin.

In order to ensure that new hydropower developments do not compromise other water uses and users, collective participation in such projects, whether in financing, can improve international relations in the basin. There is a need for ZAMCOM which is mandated to act as a focal point with other institutions on behalf of the riparian states to work closely with the SAPP. The close participation of ZAMCOM may be crucial to ensure that current hydropower developments in the basin are in line with the statutes of ZAMCOM and the provisions in the ZAMSTRAT. Projects that are part of the SAPP can be executed with increased speed and for this particular reason may complicate ZAMCOM's mandate. This should not be surprising considering that the SAPP no longer has generation surplus and the members are increasingly experiencing load shedding (Hammons 2011).

For the SAPP member states, carrying out cost-benefit analyses for energy strategies is easier, with regard to whether to develop internal energy resources or import power. Furthermore, dwindling energy supply reserves in the SADC region indicates that there is a readily available market for energy projects. This may prompt the countries to rapidly develop these projects if finances permit. On the other hand, developing water resources in an integrated and coordinated manner, as is the primary goal of

ZAMCOM, can be a time-consuming exercise. This may force the states to bypass it if they are pressed by time constraints in order to meet agreed timelines in the SAPP. This is particularly so in the parts of the basin north of the Zambezi River. However, ZAMCOM has an important role to ensure that developments in the basin do not compromise coordination efforts in the long term and that particularly for hydropower projects there is active public participation so as to avert negative social consequences associated with dams. One crucial way is to ensure that affected communities are incorporated into the project as beneficiaries and not just compensated to promote cooperation and project ownership. This would also be in line with the recognition by the ICOLD in 1997 of the need to make re-settlers of dams into project beneficiaries (see Scudder 2005). Nonetheless, ZAMCOM may face challenges if commitment to the process is weak from the riparian states especially where states perceive that their development initiatives are being obstructed by ZAMCOM's procedural guidelines. Moreover, while joint planning and development of international water resources is ideal and holds greater promise for long-term harmony in the basin, its operationalisation still remains challenging as evidenced by the existence of the Kariba Dam as the only project that has be co-developed by two states.

One of the obvious challenges facing international joint development project initiatives is that the urgency with which to develop a particular project may not be the same in all the participating countries. In other words, the geographical asymmetries in the basin offer different riparian states different incentives and interests which influence assessment of proposed projects. This is particularly challenging when a powerful coalition including the head of state is actively involved in a major water engineering project in one of the states. As Scudder argues, some of the projects that are initiated and strongly supported by the head of states may be initiated for political and ideological reasons (Scudder 2005). Nevertheless, strong political will is argued as an important ingredient to the successful roll-out of water projects (Scudder 2005).

Considered as a priority project of the then President of the Republic of Malawi, Prof. Bingu wa Muntharika, the government of Malawi in April 2005 submitted the 6 Billion US Dollars Shire-Zambezi Waterway project proposal to NEPAD on the basis that it would deepen regional integration in addition to stimulating development in Malawi (GoM 2005b). The government of Malawi however cited differences in priotisation between the governments of Malawi and Mozambique as a possible challenge to the project success (Shire 2010). Important to note nonetheless is that when projects become overly political as a result of the strong involvement of the highest office in the land, projects may run the risk of proceeding with decisions before necessary feasibility studies are undertaken as well as side-lining technocrats (see Scudder 2005). For national projects, that may not be a major hindrance, but in international projects such decisions might be costly both politically and economically as evidenced in the proposed Shire-Zambezi waterway project. As a key priority project to Malawi, the government constructed a river port in 2010 before a comprehensive feasibility study was conducted contrary to the recommendation of the pre-feasibility study (see HYDROPLAN 2006). The feasibility study aimed to assess the economic viability as well as the environmental impacts of the project (Mozambique News Agency 2010a; HYDROPLAN 2006).

The Shire-Zambezi Waterway Project is also a classic example of geographic asymmetries in successive rivers where the advantage lies with the downstream state as the project involves navigation. Based on the project concept paper, the government of Malawi intended to develop a 238 Km waterway on the Shire and Zambezi Rivers, whose larger proportion lies in Mozambique, as only 31 km lie in Malawi. The project anticipates reduction in landed transport costs by 60 per cent, a significant reduction considering that transport costs constitute 30 per cent of the import and export bill of Malawi (GoM 2005). While the project is significantly important to Malawi, Mozambique has fewer incentives to participate in the project. Unless the incentives are restructured through side payments or issue-linkages, Mozambique is unlikely to take this as a priority project. A failure also by the government of Malawi to recognise this reality and take necessary steps may stall the project in the foreseeable future.

Photo 4. Nsanje River Port unnder construction in the Shire Valley, Malawi. September 2010

Photo 5. A billboard of Nsanje Port along the road to Kamuzu International Airport, Lilongwe Malawi

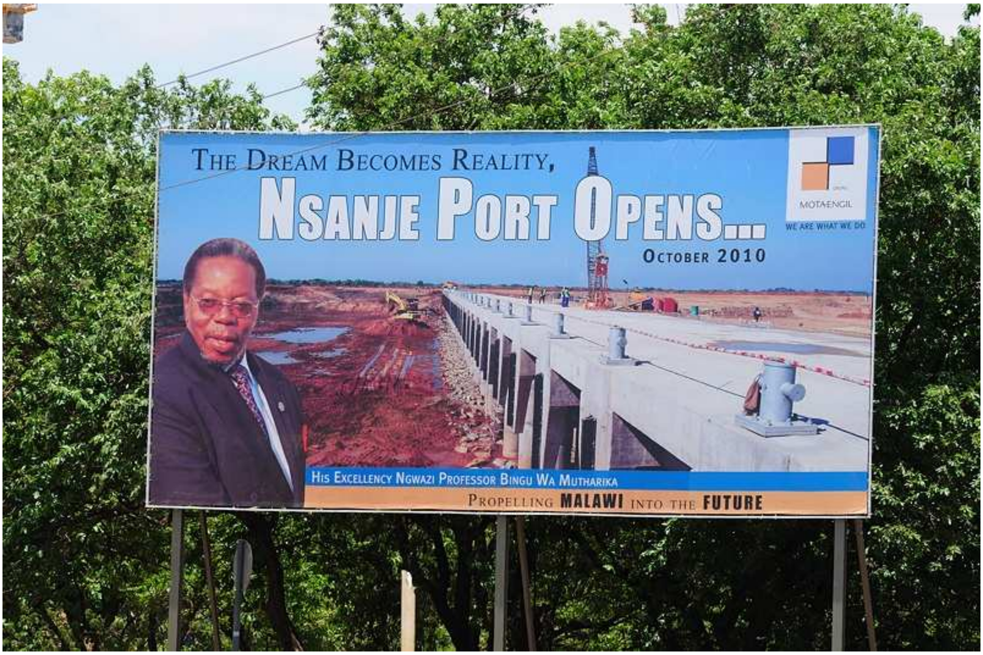

Photo 6. Billboard on the opening of Nsanje Port on the Shire River

Factors that may challenge joint development of water resources also include the disparities in financial capacities and priorities of the governments in the Zambezi River Basin. All the Zambezi River Basin states with the exception of Botswana and Namibia are classified as less developed countries. With a host of social problems, securing funds to allocate to large-scale projects such as hydro-power development is problematic as it has to compete with other important sectors such as education, agriculture and health. In addition, what one riparian state may select as its priority project in its bid to improve the living standards of its citizens may radically differ from another state. As previously argued, this further highlights that while integrated water resources development and cooperative basin-wide development approaches may be desirable for good water governance, their implementation is significantly challenging. As presented earlier on in the chapter, such disparities coupled with a lack of political will have prevented the basin countries and SADC countries in the past from generating maximum benefits from hydropower developments in the Zambezi

River Basin. Despite the fact that Chinese participation in the energy sector is critical to addressing Zambia’s energy needs as well as that of the SAPP in general, it further complicates the reinforcement of close cooperation among the riparian states in the joint management of international water resources. While it has been argued that construction projects are a key to concluding agreements that are self-enforcing and enhance cooperation, the challenge with the SAPP is that a project may involve a riparian state of the Zambezi Basin in collaboration with non-basin states. The consequence may be that in the process of meeting the needs of other SAPP members outside the basin, it may be undertaken at the expense of the other basin states.

Photo 7. Small boats docked at the Shire River port in Nsanje, Malawi

Source: Letters from Lilongwe web blog

There are planned hydropower projects in Zambia, Zimbabwe, Mozambique and Malawi. With the exception of Zimbabwe, all the other three countries have hydropower potential within their state borders and hence the temptation to treat its development as a purely national matter. All Zimbabwe's hydropower potential within the Zambezi River Basin lies on the main channel itself (Chenje 2000) and as such, Zimbabwe cannot develop any part of it without the involvement of the government of Zambia. Countries in Southern Africa are also constantly encouraged to diversify their economies in order to provide a real basis for meaningful economic development and social progress. Investing heavily in capital intensive hydropower projects on the back of the copper industry alone in Zambia is highly risky. The SAPP's huge power demands therefore remove this risk. SAPP currently needs an extra 7000 MW in order to address power supply deficits faced in the region. Assuming therefore that the copper industry will experience considerable declines in the near future, as has been the case in 2015, excess electricity supply will be consumed outside the country. As noted before, the intention of the government of South Africa to replace its high-polluting thermal electricity generation, creates a huge demand for hydro-electric power which cannot be met from the Zambezi River Basin alone. For this particular reason, the incentive to invest in hydropower projects in the Zambezi River Basin has been elevated because of the high demand that already exists in the region.

Zambia and Mozambique intend to become significant energy players in the region. Both countries are set to develop their hydropower potential for both national and export markets (Lusaka Times 2011b). Mozambique intends to become the energy power-house in the region as expressed during the 2010 Africa Energy Summit (Mozambique News Agency 2010b). Of all available power currently installed in the basin, approximately 45 per cent is in Mozambique compared to around 36 per cent in Zambia. Furthermore, close to half of the mapped hydro-electric power potential is located in Mozambique as compared to 25 per cent in Zambia (Chenje 2000). What is obvious from governmental white papers, media, bulletins and strategies is the unlikeness of the two countries pooling their resources in order to develop their potential jointly as a way of harmonising water resources development in the basin. Mozambique is about to increase its power output by 1,245 MW at Cahora Bassa through construction of the North Bank power generating station which is expected to become operational by 2015/16 (Mozambique News Agency 2011b). Furthermore, the Mphanda Mkuwa Hydroelectric Company was granted concession rights in 2010 to develop a 2.9 billion US Dollar Mphanda Mkuwa project with planned installed capacity of 1,500 MW (Mozambique News Agency 2011a). The total combined installed capacity for the two new projects will be more than half of the combined output from 18 or so power projects that Zambia has to develop in the next two decades. If the basin was truly treated as a community of interest, it would have been economically efficient to jointly develop the hydropower potential in Mozambique first and then subsequently develop more efficient projects in Zambia. However, nationalistic sentiments as well as a lack of comprehensive legal and regulatory frameworks render this approach impractical.

The Zambia-China cooperation affords the government of Zambia with the access to funds required to develop some of its hydropower potential. For this particular reason, there is no real incentive for the government of Zambia to prefer pooling resources to develop power projects located in a foreign country when there is potential at home. Moreover, involving another country in the development of resources that are pertinent to Zambia's development agenda takes it away from the bilateral approach preferred by the governments of Zambia and China. Zambia might have also for this particular reason withdrawn its participation from the ZACPLAN process, even though the government cited on-going legal and institutional reviews as the reasons. While SAPP is the right institution to reinforce cooperation between riparian states in hydroelectric power development in the basin, the institutional structure of SAPP gives autonomy to the member countries in developing their energy sources. This may weaken its institutional ties with other important institutions like ZAMCOM and may be problematic since environmental issues should be addressed wholesomely.

The SAPP may minimise the imbalances that exist between countries in terms of power generation capacities. However, imbalances in water availability still exist and according to the proponents of hydro-hegemony like Zeitoun, geographic power is the only power that is permanent. For this reason, the states in the south of the Zambezi River have to implement a number of strategies including water demand management in order to balance water supply and demand. These states can also attempt to improve supply through inter-basin water transfers, but with the current technology that strategy is not economically viable. As Swatuk & Vale have pointed out, water-intensive economic enterprises in the larger economies of the south may need to be moved to the areas north of the Zambezi River as a demand side management strategy (Swatuk & Vale 2001). By generating enough electricity in addition to better water availability, the countries of Zambia and Mozambique may become attractive for those new investments. At the same time, escalated water demands resulting from such increases in economic activities require harmonisation of water uses in the basin for sustainability and to mitigate the impacts of climate change.

While both Zambia and Mozambique may have abundant water, their geographical positions in the basin create different challenges for the two countries. In this regard, the difference between Zambia and Mozambique (both with high hydropower potential and ample water resources) is that much of the available water in Zambia is endogenous (generated within the country) while for Mozambique, as much as 75 per cent comes from outside its borders (exogenous) (Black & King 2009). As a riparian state to nine international rivers, this is much to be expected for Mozambique, though its downstream position in all the river basins (Heyns 2003: 7) makes its position very challenging. As water becomes increasingly limited, Zambia and Mozambique may be affected differently with Mozambique becoming increasingly vulnerable. What complicates Mozambique's situation is the strong dependence on the cooperation of the upstream countries for its available waters, both in quality and quantity. On the other hand, the navigability of the Zambezi River on the lower section in Mozambique in addition to the coast favours Mozambique with cheap transportation. In the situation where water continues to be relatively abundant, Mozambique has a competitive edge because of its geographical features. Thus the geographic asymmetry, in the present hydrologic conditions, rests with Mozambique when it comes to carrying out international shipping and thus business opportunities. So far, as of 2008 and 2009, FDIs were highest in Angola followed by Zambia and Mozambique respectively. China remains the biggest source of FDIs in the basin.[31] Nonetheless, further hydropower developments in Mozambique will create new hydrogeological and hydro-political realities and thereby influencing future negotiations over water particularly for the upstream states. This means that to avoid conflicts, proposed projects in the future will have to factor in developments that have already taken place in Mozambique and for that reason may limit what the upstream states may do with the water system. This is line with the current practice in water management but also based on the provisions of the international watercourse law especially relating to the issues of harm.

The biggest challenge with hydropower projects as noted is the long gestation period and the high upfront capital required (Kumar et al. 2011). In the context of the energy crisis currently faced by the Southern Africa countries, both South Africa and Botswana are currently developing coal thermal power plants in attempt to address their energy supply deficits. South Africa is developing its 400 MW Medupi station, completion of which has been delayed by a series of industrial actions. Botswana on the other hand was developing a 600 MW Morupule B Power station. Nonetheless, by increasing the commissioning of thermal power plants, the composition of hydropower in the energy mix will not improve significantly which is also in line with findings by the IPCC on the global scale (see Kumar et al. 2011). It is also challenging for the member states to reduce emissions of greenhouse gases with more thermal power plants being put in use. Moreover, the sudden development of such projects has limited development prioritization that would have generated maximum benefits for the power pool (see ECA 2009). On the other hand, dwindling energy supplies is a

[31] Data on foreign direct investments on the SADC website

pressing issue and states have to take all the necessary steps to meet demand, and the long gestation periods for hydropower projects pose timing challenges (Mbirimi 2010). SAPP however has been operational for over 15 years now, and some of these deficits were foreseen. Demand for electricity has been soaring at an average annual rate of three per cent, while both population increases and economic expansion have pushed up electricity demand (Hammons 2011). As Mbirimi argues, striking the right balance between meeting short-term and long-term energy requirements in a way that promotes reliability, cost effectiveness and less pollution is key to the energy sector's performance in the region (Mbirimi 2010; see also Kumar et al. 2011).

The current form of the SAPP as a power trading institution (see Hammons 2011) may be a hindrance to true cooperation over energy in Southern Africa. As long as energy development complies strongly with national development plans rather than regional, cooperation will only be restricted to trading based on supply and demand. In its true sense, energy development is supposed to be closely coordinated as per article 3(2) of the 1996 SADC protocol on energy to ensure that prioritised projects generate maximum benefits. At the same time, such projects should not compromise the other principles of SAPP and SADC such as environmentally sound development of energy sources (SADC 2006). The 2005 SADC regional water policy emphasises the need to develop hydro-electric power in the region. In addition, the 1996 SADC protocol on energy under section 1 defines energy pooling as "*co-operation among parties or entities in development, transmission, conveyance and storage of energy in order to obtain optimum reliability of service, economy of operation, and equitable sharing of costs and benefits*" (SADC 2006: 4). In line with this definition, it is only sensible that, considering the high capital costs for such projects, states have to pool financial resources to finance them. Cooperation and interdependence will only take true shape once these states shift towards joint financing and development of projects. By embracing this shift, the SAPP member states have a chance to attain the goal of the SADC protocol on energy, outlined in article 2(2) which states that member states shall "*use energy to promote collective self-reliance among member states*" (SADC 2006: 6).

Collective development of new hydropower plants is crucial to ensure that these projects are tailored to respond better to varied demand curves in the region but also importantly that they are able to provide optimum power with minimum negative consequences. Such being the case, it is important that ZAMCOM takes the lead role within the Zambezi River Basin to make sure that joint development of hydropower plants involves as many states as possible in the basin. Joint projects have proved resilient in the past and have truly formed a solid platform for more cooperation between the riparian states. The Kariba Dam is a good example as it has operated smoothly even when political tensions existed among the two states (Soils Incorporated (Pty) Ltd et al. 2000). It has continued to be a uniting factor under different political configurations and has promoted sharing of information for the purpose of dam operations. Moreover, joint development of projects will allow the basin to be treated as a shared basin and curtail national interests which currently continue to drive development of hydro-electric power plants in the basin. Since water availability is heavily tilted to the areas north of the Zambezi River, nationalistic approaches limit the participation of states south of the Zambezi River. This is not a good recipe to promoting water resource use efficiency and positive international relations in the basin.

One way of developing water resources in an integrated and coordinated manner is to ensure that dams are multipurpose in design (Kumar et al. 2011). This is particularly relevant in Southern Africa, where high water variability in the region impairs the reliability of resource exploitation. This hydrological reality necessitates significant investments in water control structures such as dams as well as inter-basin transfers in order to improve water resource availability (SADC 2005; Kaniaru 2010). Dams are therefore a necessary part of the water infrastructure and while meeting the growing energy demands, their value can only be enhanced if they are multipurpose in design. This has been the key weakness with the large dams in the basin, in that they have been single purpose in nature (see Mukono & Mulendema 2000; Mukosa 2000). This is however a lost opportunity. Even at policy level, both at the national and regional level, the approach to water management has been sector specific which challenges integrated river basin management (Chenje 2000).

Designing dams as multipurpose provides the opportunity to increase gains from such projects through multiple uses of water and therefore provides the potential to achieve IWRM (Kumar et al. 2011; see also Scudder 2000). This also increases the attractiveness of such projects since accrued benefits from multiple uses of the water stored in dams may be considerably increased (Kumar et al. 2011). Moreover, the cost of the dam per output unit significantly drops as water becomes increasingly used for different purposes. Importantly, the opportunity to increase cooperation among various stakeholders is also enhanced. Taking for instance the Kariba HEP dam, professionals in the energy sector continued to work closely together even when political relations between the two states were not conducive to this (see Mukosa 2000). Had it been that the dam was multipurpose, more and more professionals and community members would have continued working closely together so that with such broad levels of cooperation, it would be increasingly impossible for the two states not to cooperate.

The basin has already experienced the costly effects of lack of cooperation particularly in other areas other than just power production, when due to the lack of flood control measures and coordination of the dam operators, many downstream residents were killed and displaced (Scudder 2000; Scudder 2005). If the states therefore streamline their focus on developing hydropower projects due to the gravity of the situation, i.e. the strong need to address deficiencies in electricity supply, an important opportunity to implement integrated projects may be lost. The end result may be that such costly structures may be underutilised, as has been the case with many large dams (Scudder 2005).

Joint power projects or increased interdependency among the basin states may also allow externalities to be internalised, and this can increase the states' willingness to cooperate (see Dinar et al. 2007). For instance, if an upstream country relies on power produced from a downstream country, the upstream state in this case may not use the river in a way that has detrimental effects on power production in the downstream state. This means that negative unidirectional externalities common in successive rivers or sections of a river can be minimised as the upstream state starts to internalise the externalities it generates. Currently, water abstraction from the Zambezi in Botswana and Namibia is limited due to the fact the river is located far away from the industrial areas and farms. If these two states are closely involved in the development of hydropower downstream, their future plans to utilize water from the Zambezi will be considered holistically, since they may not want to negatively affect power supply. That may not be the case now particularly if they resort to other sources of energy.

From the above argument, it seems that increasing cooperation in the basin and the promotion of treaty compliance will benefit significantly from equitably sharing benefits as well as having proper mechanisms for resolving conflicts (Giordano & Wolf op.cit in Dinar et al. 2007: 39). Equitable sharing of benefits allows flexible allocation of water since the states may be more concerned with the overall benefits which permit water ration trading, just as is the case with power trading (Sadoff & Grey 2005). On the other hand, some other scholars propose river basin management as a true community of interests, where rather than sharing water between the states, a river basin management organisation for instance manages the shared waters for the mutual benefit of all the riparian states (Dinar et al. 2007).

The lack of political will to maximise energy sharing has always threatened mutual cooperation in the past. This may raise questions regarding the validity or sincerity of states to enter into regional treaties and other agreements when they continuously pursue national development strategies that seem to conflict those regional agreements. The government of Zimbabwe decided to build its own thermal power stations when hydro-electric power was relatively abundant in the basin at the beginning of the 1980s. Other commentators have highlighted the disagreements over the debt settlements on the Kariba HEP as the reason (see Soils Incorporated (Pty) Ltd et al. 2000). Certainly the cost of building the stations in addition to the operational costs of the stations would not have been lower than that of importing electricity from the hydropower stations in the Zambezi. The general trend in the region tends to suggest that the states resort to regional cooperation when they are severely limited in their national capacity. This is well evidenced from the Zambia's Power Sector Development Master Plan and Zimbabwe's plan for Rehabilitation and Recovery in the Power Sector where the objective is to develop the internal resources first while pushing the development the development of the Batoka Gorge to a later phase (Chubu 2010; AfDB 2011; Scudder 2000). Even where the exploitation of national resources does not yield any comparative advantage, many of the states seem to overlook those economic realities. It is imperative particularly in this competitive age for the states to move away from nationalistic attitudes that seem to hinder regional and sub-regional cooperative efforts and mutual interdependence. This may require ceding some of the sovereign rights. Instead states have to develop strong regional legal and regulatory frameworks that are well harmonised with national ones and which can promote the spirit of cooperation and mutual interdependence as per article 3(1) of the 1996 SADC protocol on energy (SADC 2006). However, considering that the idea to have a supranational grid company with a mandate to operate the SAPP independently was not supported due to autonomy issues, it is going to be difficult to harmonise planning, for some time into the near future (see Akapelwa 1996).

The establishment of the ZAMCOM Secretariat through its ratification is an important step in the Zambezi River Basin, especially now as important development projects involving water resources are starting increasingly to take shape in the basin. How effectively ZAMCOM may deal with water issues as water resources become unevenly developed will depend on the sustained commitment of all the riparian states. Mozambique holds the key because as a downstream state, the losses are greater if this agreement is not properly honoured by the upstream states. Assuming that the Shire-Zambezi waterway project is implemented at some point in the future, Malawi may be equally interested in ensuring that the upstream states hold the agreement in place. That may not be true at the moment, when Malawi as an upstream state in the lower sub-basin of the Zambezi River cannot be physically harmed by water developments on the main Zambezi River. If Botswana and Namibia increase their share of the Zambezi River waters, there might be some effects on the water budgets in the middle and lower sections of the Zambezi River. The level of that effect will depend on how effectively the middle and downstream countries ensure that activities in the upstream countries are in line with what is stipulated in the integrated water resources management plan for the Zambezi River Basin. However, as of current, there are not enough instruments to effectively monitor water availability in the Zambezi Basin (World Bank 2010). Without adequately documenting water resources, suspicions and mistrust may complicate development initiatives in the basin particularly as some countries increasingly become financially capable of developing their own water resources. It is in the presence of suspicions that conflicts over use of international waters arise.

5.7 Summary

The combined effects of regionalisation (through SAPP and other economic linkages), climate change considerations and Chinese involvement in the Zambezi basin present new opportunities and challenges for cooperation in the basin. The increasing need for cleaner and cheaper electricity and the operationalisation of the SAPP have made hydro-electric power projects viable once again. In addition, power supply deficits currently faced by the SADC countries necessitate rapid development of new energy sources. This has increased the economic justification of potential hydropower projects in the Zambezi River Basin. The increasing Chinese involvement in some of the basin countries therefore has serious implications for the development of water resources, water use agreements and policies in the Zambezi River Basin. This necessitates strong cooperation of the basin states in order to promote water resource use efficiency, environmental sustainability, and the achievement of mutual gains and the strengthening of interdependency among the basin states.

The high proportion of Chinese FDIs in Zambia and Mozambique challenges international water cooperation simply because demands, capacities and time plans will become progressively different among the riparian states. In the context of hydro-geography of the basin, Zambia is in the meantime focussing on developments on the Kafue and Luangwa Rivers, solely located in that country while Mozambique intends to develop project sites below Cahora Bassa, also located entirely in the country. Partly due to sovereignty considerations, the development of these projects seems to be driven by national interests and exclude project participation by other states in the basin. Moreover, the development of some of the projects intends to address needs outside the confines of the basin i.e. power supply deficits in the states outside the basin. What this implies is that there is a danger to continue to construct dams as single-purpose projects in order to address energy requirements in the region. This approach may also miss other important water uses and users in the basin .i.e. rural residents. Studies in the basin have shown that while national blueprints for energy development in the SAPP member states include rural electrification, power interconnection projects currently intend to address the needs of bulk consumers (see ECA 2009). Deliberate efforts are required to broaden the development focus of water resource projects in the basin.

As China becomes an important alternative source of funding (Alden 2007), regional mechanisms for dealing with water and energy issues may be put to the test. China's bilateral approach in its African policy is likely to influence how countries appraise and implement their projects. The injection of FDIs in Zambia and Mozambique also continues to increasingly tilt the balance of power to these states which are already advantaged geographically, though in different ways. Hydro-electric power developments, in addition to increased industrialization in those countries, will accelerate the uneven development of water resources in the basin with significant hydrological implications and may possibly influence future negotiations over water. If ZAMCOM cannot lead the process, the chance to promote water resource efficiency, i.e. maximizing gains while at the same time minimizing environmental damage, is slim. Moreover, through ZAMCOM, international cooperation can be promoted if water development is promoted at the basin level rather than at national as it has been the case. It however should be noted that while joint management of water resources is desirable, the urgency to carry out particular projects may not be the same with all participating countries and thus might reduce its attainability. Those riparian states that have access to finances may thus be impelled to develop projects unilaterally, a situation that may tempt the riparian states to treat water resources development purely as a national matter and disregard existing agreements.

As the twenty-first century progresses, the region faces uncertainties over the availability of future water resources largely due to climate change. What is however certain is that the positive developments in the economies in the riparian states will escalate the demand for water. Nevertheless, since water is a finite resource, there is a limit to which those demands may be satisfactorily met without raising tensions among the users. National development plans in the basin indicate that the largest consumer of the water resources in the future will be irrigation projects (Heyns 2003). The expansion of irrigation projects will significantly alter the water resource use patterns considering that water use for irrigation currently constitute only 2.5 per cent as compared to around 16 per cent for hydro-electric power production. Such changes will not occur without implications for the system performance of the hydro-electric power plants especially if developments continue to be independently carried out. Current development of hydro-electric power plants should therefore be undertaken in consideration of other potential uses in the basin. Where hydropower projects are well planned, the chance to achieve enhanced cooperation in international basins as well integrated water resources management is higher (Kumar et al. 2011). It is unlikely that the developments of the Kafue Gorge lower and the upgrading of the Kariba north power station are guided by the ZAMSTRAT since the plans for these projects were developed before the ZAMSTRAT was finalized and Zambia was not even a party to ZAMCOM. However, it will be important for ZAMCOM to work closely with Zambia to ensure that such developments allow the smooth development of the river for other uses. A failure to harmonize current projects can lead to conflicts and underutilization of the water resource.

The management of water resources should increasingly become an important international agenda through ZAMCOM if the integrity of the river basin is to be maintained. Developing jointly the water resources at the basin level or in smaller blocks can be the most feasible way of encouraging harmony in the basin. In the absence of joint water resources development, the downstream states, particularly Mozambique, hold the key in ensuring that the recent increases in economic activities do not drive the upstream countries away from their commitments to the water management instruments in the basin.

The role of public participation is well-enshrined in the statutes of the ZAMCOM through its ZAMSTRAT. Addressing the electricity supply deficits in the SAPP coupled with the rapid pace of implementation of Chinese-financed programmes, runs the risk of bypassing public participation in important developments such as hydropower development. Experience in the basin shows that while the role of public participation has been part of the water treaties in the basin since the ZACPLAN, water management has continued to be sectoral and seldom involves the general public (Chenje 2003). As a development that often requires relocation of communities, issues of relocation and compensation have to be fully considered from the onset of project development (IHA et al. 2000). Nevertheless, the potential downside to active engagement of the general public is that the process may be time-consuming and may thus discourage private project financers or in this case the Chinese banks or state-owned enterprises.

The combined effects of regionalization in form of power pooling, climate change considerations and high energy demand in Southern Africa create considerable opportunities for developing the hydropower potential in the Zambezi River Basin. ZAMCOM will need to be proactive to ensure that while such developments take place, they do not compromise harmony in the basin, between water uses, as well as between users. The pressing need to address energy supply demands may necessitate accelerated implementation of projects. While that may be long overdue, the challenge is to ensure that project implementation is in accordance with the principles and procedures outlined in the ZAMSTRAT. This may be time consuming which may force some countries to pull out of the treaty if mechanisms cannot be found to facilitate such developments without involving the time-consuming process of negotiations.

Chapter six

Conclusion

This thesis set out to provide explanations to the current status of international water management in the Zambezi River Basin by addressing four key objectives, and has presented a historical-geographical analysis and narrative of the development of the Zambezi basin, with a focus on hydropower. By reconstructing the main geographical, hydrological and political developments, it has been shown that while numerous opportunities for cooperation and mutual interdependence exist among the basin states, water cooperation in the basin has generally been weak. In its last five chapters, the thesis has explored and explained why such is the case in the Zambezi River Basin through the analysis of hydropower developments.

6.1 How have hydropower projects influenced international water management in the Zambezi River Basin?

Hydro-electric power projects have been at the centre of the analysis and for good reasons. The first ever international water project in the basin involved the development of a hydro-electric power project. The way the river runs through this part of Southern Africa has afforded it huge hydropower potential, but the location of the potential hydropower sites has also helped undermine cooperation.

By using available literature, the initiation of hydropower dams in the basin has been attributed to the escalating demand for raw materials in post-Second World War Europe, which led to new developments in British Central Africa. New energy sources were required to keep the mines operational in the copper belt in a bid to satisfy high demand in the developed world and facilitate industrialisation in the Rhodesias, particularly Southern Rhodesia. Dams therefore became necessary as a means to modify the natural flow so as to facilitate hydro-electric power production for the social and economic development of the Rhodesias. By reviewing literature on the hydraulic mission, it is clear that these modifications were also facilitated by the prevailing water management philosophy, where major waterworks signified human ingenuity over nature. Several key actors were involved in creating the new hydro-geological and hydro-political reality in the basin, which included engineers, international finance institutions, development practitioners, state administrators, etc.

While the main reason to initiate hydropower projects on the Zambezi was principally economic, other factors also consequently influenced the nature of international water relations in the basin. Although the economic environment was right to engage such costly projects, the political environment was not conducive. As a result, power dynamics played a significant role to make the projects a reality. On the one hand, attempting to understand post-colonial international water management in the Zambezi River Basin necessitated exploration of the colonial geopolitics. As the initiator of the hydro-electric power projects, the colonial administrative architecture was instrumental in shaping post-colonial hydro-politics. Being export-oriented administrations, navigable rivers and harbours were vital to facilitate exports in colonial times. As such, the geographical advantage rested with Portugal through its coastal annexation of Mozambique and lack of navigable rivers in the British territory.

Consequentially, the powers were occupied with the requirement to address their short-term needs and had less regard for long-term hydro-political consequences in the basin. By using Zeitoun's hydro-hegemony theory (Zeitoun 2006), the thesis argued that Britain as a hegemonic power used a number of strategies geared at securing the cooperation of Portugal but not necessarily to seek its mutual cooperation. For this reason, Britain used the territory of Nyasaland for instance as a hegemonic compliance producing mechanism, by redrawing the map to cede more territory to Portugal so that the Portuguese could not interfere with activities at the Kariba Gorge. By utilizing the work of Wolf et al. (2003) on identifying basins at risk of conflict, the internalization of the Zambezi River basin, in line with their argument, put the basin at risk by facilitating border disputes over water. Today, the government of Tanzania is in deadlock with the government of Malawi in a bid to shift the frontier between the two states to the median of the lake in line with the Malawi-Mozambique frontier drawn up by the 1953 Exchange of Notes between the Governments of Portugal and Great Britain. This deadlock does not create a conducive environment for enhanced international water cooperation since the recognition of sovereign territories is key to establishing property rights and modalities of cooperation. In this case, the development of the Kariba Dam produced negative consequences for Malawi.

On the other hand, one of the underlying reasons that international water cooperation in the Zambezi River Basin has been weak is the timing and the mode of implementation of the Kariba and the Cahora Bassa HEP projects. Its analysis highlighted inherent problems of asymmetric power relations in water resources control in large and complex basins. The need for stable and experienced governments, and broad institutions to attract funding, as well as the presence or creation of mature markets to absorb electricity production necessitated and in some cases gave the impression of a resolve by the colonial administrations to sustain colonial rule. By historical coincidence, these projects were proposed and executed in the post Second World War period at the same time as the wave of African nationalism was at its peak. Consequentially, the design of such projects aimed to secure the rights of one state over the other or one group over the other with little regard for basin-wide implications. Dams were therefore inherently political; they produced power of course but were also used to subjugate others. This has been discussed in detail in the case of the Kariba HEP project, particularly regarding the choice of the Kariba over the Kafue as well as how the Kariba HEP project was executed.

The Kafue project was sufficient to serve the electricity needs of the copper belt, but its location in Northern Rhodesia and intensification of African nationalism in that colony rendered the project a security risk with regards to the needs of Southern

Rhodesia, an autonomous colony in British Central Africa. The Kariba HEP project was therefore prioritised among other factors to tilt the balance of power in favour of Southern Rhodesia because its location neutralized the level of physical water control that Zambia would have on the Kafue when granted independence. In such a huge basin with eight riparian countries, the internalization of the basin through the decolonization process and the birth of new states, as Wolf et al. argue, changed the political configuration of the region significantly and dynamically thereby posing challenges to international water management. The linking of HEP projects to the intention of the colonial administrators to sustain colonialism limited the opportunities for project participation and power interconnection, particularly on the part of the independent states in the basin.

It was argued that the linking of HEP projects to the persistence of colonialism by the nationalist leaders as well pan-Africanists was not without basis. Portugal at least was upfront about its intentions in Mozambique, and that was to stay there forever. The colonial powers too intended to use the dams for other reasons other than just economic and developmental. Drawing from strategic interaction's component of issue-linkage, the government of South Africa, for strategic political reasons, became an integral part of the Zambezi River Basin hydro-politics by participating in the development of the Cahora Bassa HEP project. As literature shows, there were no just economic reasons for the government of South Africa to participate in the Cahora Bassa project, at least at the time the project was proposed. Nevertheless, the provision of buffer states to the north of South Africa and possible deterrence of attacks by South Africa's own nationalist fighters operating from neighbouring countries was appealing to the ruling government there. Thus in line with Barrett's strategic interaction (Barrett 1994), participation was a strategic choice for South Africa by linking the HEP project to political security. For Portugal too, the dam and reservoir were seen as important barriers to the smooth advancement of FRELIMO forces southwards, particularly from the Zambian side. The implications were that the design and execution of these dams became territorially focused and reduced their attractiveness to other states as they were designed to address the needs of hegemonic states and groups. These strategies by the colonial governments arguably laid the foundations for sustained nationalistic tendencies towards the development of water resources in the Zambezi River Basin.

Using the concepts on nationalism and sovereignty, it was argued that the strategies adopted by the post-colonial governments aimed to advance nationalistic sentiments by avoiding or weaning themselves from colonial projects that would be used to subjugate them and therefore affirm their sovereignty. Similar studies of other river basins have shown that huge projects to control water also tend to be a means of controlling people (see Tvedt 2004). The developments of the Kariba north bank power station and Kafue Gorge by the government of Zambia were cited as a good example of embracing national energy self-sufficiency as a viable strategy to attain energy security and political autonomy. Coupled with the destabilisation activities by the South African Government and its operatives as well as civil wars and liberation struggles, the overall environment in the Zambezi Basin was not conducive to the participation in international water projects as well as power interconnections. Consequently, the region had an oversupply of electric power by the beginning of the 1980s, leading to a slowdown in the further development of water resources. However, it should be pointed out that the hydro-geography of the basin, i.e. more water availability in the parts of the basin north of the Zambezi River, allowed Zambia and Malawi to develop internal hydropower sources in order to avoid economic blackmail and gain political autonomy. These strategies to attain national energy self-sufficiency only made sense for these states because they had alternative sources as opposed to the limitations that Zimbabwe has faced. The Zimbabwe Government's decision to develop the Hwange Thermal Power Station at the beginning of the 1980s when the region had an oversupply of hydro-electric power both in Mozambique and Zambia also attests to the nationalistic approach to energy security by the riparian governments in the Zambezi River basin and reflects on both hydrological and geographical limitations that the country faces in developing hydropower.

6.2 How has the riparian concept influenced the control and use of Zambezi River within individual basin states?

The combined effect of the hydrology of the river, the way major hydropower projects were initiated in the Zambezi River Basin and the decolonisation process of the basin states as well as resistance to decolonisation by some of the colonial governments, notably South Africa, rendered international water projects a risk to the riparian states. The fact that some of the infrastructural projects were targeted in combat operations, including dams in some of the basin states, removed incentives for participation in international projects. Additionally, the fact that these major projects were initiated by colonial governments in the wake of African nationalism and pan-Africanism, the participation of the riparian states in such projects would not be ideal as that would betray the spirit of pan-Africanism which most of the African leaders supported. Consequentially, for a number of reasons, the development of the Zambezi River Basin was approached as multinational, with less regard for basin-wide implications. With the exception of the contiguous parts of the basin, the riparian states focused on developing the resources located within their territorial confines as a national matter.

In contiguous parts of the basin for instance, such as on the border between Zambia and Zimbabwe, cooperation has been hampered by the difficulties of aligning the priorities of the two states in developing hydropower projects. While the development of the proposed Batoka HEP project has been of major importance to the government of Zimbabwe, it has not been the case with the government of Zambia. Since no single state can proceed with the development of this part unilaterally, the Zimbabwean Government has been limited in its development options. As a result, power sector development plans in the two states has concentrated on development of those resources located within individual states first i.e. thermal power plants for Zimbabwe and a range of hydropower projects for Zambia.

Cooperation on successive parts of the river basin on the other hand has been hampered by security considerations and lack of autonomy by states considering power interconnections. This is evident in the proposed Malawi-Mozambique power interconnection project, which has been pending since late colonial times. Thus, while there have been opportunities for enhanced cooperation among the basin states through hydropower projects, cooperation has been hampered by different reasons. What these different geographical configurations of the basin imply is that the subsequent asymmetries generate different interests and incentives for the states, which in the case of the Zambezi River Basin have been overlooked in water treaties and has resulted into weak international water relations.

Contiguous and successive configurations of the basin also reveal an important difference between the two configurations. In contiguous parts, where a project has been successfully developed, for instance in the case of the Kariba HEP project, cooperation has been sustained regardless of the nature of the development of interstate political relations. This obviously relates to the issue of reciprocity and mutual interdependence of the two states. Contrasting it with the Cahora Bassa HEP, a different conclusion can be drawn. Due to lack of autonomy by the power importing states or those considering it, security concerns may be at the centre in those states, particularly if interstate relations are not conducive to international cooperation. The Malawi-Mozambique interconnection has already been cited in this regard.

Taking into consideration also the case of South Africa, even though not a basin state, its power connection to Mozambique was repeatedly disrupted by RENAMO guerrillas as the relationship between South Africa and Mozambique worsened. However, one should not read too much into this incident because the reliance of South Africa on electricity imports from Mozambique was negligent, thereby allowing other strategic issues to take precedence. Perhaps if the level of interdependence was high, this project might not have been sabotaged since RENAMO had close ties with the government of South Africa. Nonetheless, it casts a shadow of doubt on the security of relying on energy resources from outside the state in successive parts of the basin, especially where such projects are not jointly developed and co-managed.

6.3 Why did the Basin States seek coordinated management of the Zambezi River?

Relying on the work by various scholars including Wolf, Cooley (1984), Conca et al. (2003), Gleick (1993), Toset et al. (2000), Gleditsch et al. (2004), International Law Commission, Green Cross International (2000) and the UN among others, the thesis argued that the proliferation of conflict and cooperation discourses on international water management from the 1980s influenced the early attempts by the riparian governments in the Zambezi Basin to draft mechanisms to coordinate water resources development. It was also pointed out that just like the Southern Africa Development Coordinating Conference (SADCC) treaty signed in 1980, the incentives to participate in such treaties was strategically political. This is evidenced by the fact that water relations in the basin were generally non-conflictive and mainly a consequence of lack of water resources development in the states north of the Zambezi River. Initiated and strongly supported by the United Nations Environmental Programme (UNEP), the Zambezi River Action Plan (ZACPLAN) agreement was signed in 1987 in Harare by the governments of Botswana, Mozambique, Tanzania, Zambia and Zimbabwe. The agreement was a political strategy by the river basin governments to isolate the government of South Africa. While the agreement aimed to prevent future conflicts through coordinated and judicious development of the Zambezi River waters, the need for coordinated international water resources management was secondary. Instead, the riparian states viewed it as an opportunity to exemplify black solidarity and eliminate any possibilities for the government of South Africa to tap the Zambezi River waters in the future. A strong political basis for the project also implied that critical issues in international water management such as water availability and variations in the basin, riparian positions, geographic asymmetries and possibilities for side payments and issue-linkage in order to facilitate mutual cooperation were not considered. As such, the progress of implementing the ZACPLAN was sluggish.

The Southern Africa Development Coordinating Conference (SADCC) was established in 1980 with a mandate that included the promotion of power development and interconnection. Nonetheless, the appeal to participate in the group remained its political front. Some scholars argued that SADCC was ineffective as a regional economic body because of its heavy political basis as its programmes and approaches focussed on fighting the apartheid in comparison to other areas. Furthermore, the SADCC statutes allowed the national programmes to take precedence whenever they were in conflict with SADCC programmes signifying that nationalistic sentiments were well protected within the SADCC treaty. Some of the riparian states such as Zambia preferred bilateral agreements on the basis that the regional grouping was time-consuming and ineffective. The decision therefore to let the SADCC oversee the implementation of the ZACPLAN as opposed to a special secretariat created for such purposes was not only perplexing but importantly signified that the riparian states were not ready to transcend their national interests. This importantly implies that the riparian states preferred to define their own parameters for water resources development rather than letting a third party institution control the process. This also shows that while the ZACPLAN agreement was indeed signed and implementation began, the agreement lacked a practical basis and had no real impact on the individual states' approach to water resources development.

In an attempt to further understand the lethargic implementation of the ZACPLAN, work by Rangley et al. was also cited to explain why implementation of the ZACPLAN faced so many challenges. Their work suggested that successful river basin institutions in Africa were characterised by a number of important factors which included: small number of participating countries; real need for development with emphasis on socio-economic benefits rather than political aspirations; well-focused and technically sound objectives; emphasis on the construction of works rather than on planning; strong commitment by member countries; and active support from ESAs. Most of these important attributes were missing in the context of the ZACPLAN.

The coming to an end of the apartheid regime in South Africa and granting of independence to Namibia at the beginning of the 1990s changed the political configuration in Southern Africa, with implications for international water management institutions. As Conca argues, cooperation on international water management is enhanced where the riparian states cooperate in general. The 1992 Southern Africa Development Community treaty signed in Windhoek in August 1992 paved the way for the development of regional instruments for international water management. The need for a river basin institution to manage the ZACPLAN highlighted the need for a regional instrument to guide the institutionalisation of river basin organisations as well as their mandates. Some scholars have highlighted this as one of ZACPLAN's key contributions in Southern Africa. Negotiations on the ZACPLAN, particularly regarding the establishment of the Zambezi Watercourse Commission, were consequently suspended to pave way for the establishment of a regional water protocol. In 1995, the SADC protocol on shared watercourse systems was signed by the members of the SADC including all the Zambezi River Basin states.

The provisions of international watercourse law have also contributed to the developments in international water management in the Zambezi River Basin and Southern Africa as a whole. The 1997 United Nations Conference on the Law of Non-navigational Uses of International Watercourses, with its key principles of reasonable and equitable utilisation and obligation not to cause significant harm influenced the revision of the 1995 SADC water protocol and in 2000, a revised water protocol was signed and ratified in 2003. This reflected the key principles of the 1997 international watercourse law.

The negotiations to establish the Zambezi Watercourse Commission as a legal instrument to guide water resources development in the Zambezi River Basin following the ratification of the 1995 SADC water protocol were terminated in 1998 when the government of Zambia withdrew from the process. National legal reviews were cited by the government of Zambia as underlying reasons for their withdrawal from the process. In 2004, an agreement to establish ZAMCOM was signed by the remaining seven states in the Zambezi River Basin. The ZAMCOM agreement also embraces the key principles of international watercourse law and thus reasonable and equitable utilisation and the obligation not to cause significant harm. Rather than devising a specific instrument to address inherent issues in the Zambezi River Basin, the states preferred to adopt the generalized principles of the UN Convention, a development that endangers overlooking key issues that may be a key to promoting water cooperation in the basin.

Some scholars like Giordano & Wolf have criticised the generalised principles of the international watercourse law in that they do not provide enough guidance with which to address property rights in international watercourses. Even though article 6 of the international watercourse law lists a number of factors that must be taken into account when attempting to establish what is reasonable and equitable, the factors are broad in character and not weighted. This indicates that the onus is on the states to establish what is equitable and reasonable. Nevertheless, the adoption of these generalised principles in the ZAMCOM agreement means that issues such as geographic asymmetries, different incentives and interests as well as adaptation of the generalised principles to suit the overall conditions in the basin have not been addressed. What this entails is that there is strong need for other instruments, especially associated with joint projects to categorically address the rights and responsibilities of states in the Zambezi Basin.

It has also been argued in this thesis that the withdrawal of the government of Zambia from the ZAMCOM agreement was a challenge to the success of ZAMCOM. The geographic position of Zambia, as the source of the Zambezi River, as well as the riparian relations it has with most of the basin states is significant. Zambia has contiguous relations with Namibia, Botswana and Zimbabwe while having through-border and contiguous relations with Angola and Mozambique. The implications here are that the other basin states face limitations to develop these parts of the watercourse without involving the government of Zambia. On the other hand, the hydrologic contribution of Zambia to the Zambezi River waters is also significant through the Kafue and Luangwa Rivers. Since these rivers are solely located in Zambia, the government of Zambia is already in the process of developing them to satisfy its energy requirements. From how successive river parts of the river have been treated, if joint projects are not encouraged, there is here a danger to be overly nationalistic in the development of these water resources. Zambia might have also withdrawn its participation in the ZACPLAN and later ZAMCOM because its position in the basin and hydrological contributions necessitated it to assess to potential gains from a cooperative process as compared to non-cooperation. Other sources of information have indicated that Zambia was uncomfortable with any arrangement that failed to adequately recognize the variations in hydrological contribution to the basin and allocating water accordingly. Future studies may need to analyse the underlying reasons behind Zambia's decision to join ZAMCOM again and whether issues that were of concern were addressed within ZAMCOM.

6.4 How will major proposed water engineering projects shape developments in the basin?

Hydropower projects were at the centre of focus in this study because HEP projects constitute the single highest use of water in the basin. Moreover, hydro-electric power projects place a significant amount of stress on the water system through the requirement of a minimum flow rate. This necessitates in most circumstances, as in the case of the Zambezi Basin due to its hydrology and geography, construction of dams to regulate flow and in some cases placing limits on other types of water uses. This kind of river modification has wider implications both in the upstream and downstream areas i.e. alteration of flow rate and timing of flow etc. As the Zambezi River Basin is an international river basin, dams have had positive and negative as well as unidirectional and reciprocal externalities that complicated international water relations but at the same time presented numerous opportunities for enhancing international water management. Importantly also, these attributes of HEP projects created opportunities for implementing integrated water resources management.

This thesis has explored changes in both the natural and social factors that may influence how water resources may be developed now and in the future. Climate uncertainty and the need to reduce greenhouse gases have created opportunities that may play favourably to the development of water resources in the Zambezi River Basin. While hydro-electric power, considered as green energy, has been controversial in the past due to its social and environmental implications, the need to address climate change has opened up new opportunities for development and funding. Furthermore, due to the hydrologic and geological dependency of such projects, there have often been mismatches between demand and supply in the basin states and in Southern Africa as a whole. This has meant that in areas where huge potential exists, it has not been matched by internal demand. Mozambique is a good case in point.

Reducing greenhouses gases in a bid to curb climate change will require a shift to green energy of which hydro-electric power currently constitutes over 80 per cent. The government of South Africa holds the greatest potential to consume hydro-electric power owing to its large base of coal-based thermal power supply and its high economic but energy-intensive activities. Nevertheless, water resources in South Africa are not conducive to hydropower development in the country. On the other hand there is untapped hydropower potential in both the Zambezi and Congo River Basins. This geographical asymmetry presents the potential for a win-win situation for the countries in Southern Africa. In fact, the expansion of the market base for power projects is one of the reasons why the Southern Africa Power Pool was established.

The lowest water levels in the Lake Kariba in 1992 since it reached full supply level in 1963, however underlines the vulnerability of hydropower developments in the basin to climate change. Long periods of drought in the basin reduced the amount of precipitation received as well as increased the amount of water evaporated in the reservoirs. This development underscores the fact that no waterscape can be completely controlled since the construction of the dams was unable to completely modify the characteristics of the river for the benefit of hydro-electric power generation during drought conditions. Water resources planning for the future therefore need to take into consideration this reality and incorporate risk management measures, such as the extension and strengthening of power interconnections and widening the sources and types of electricity generating projects. This also calls for closer coordination between the basin states and dam operators to optimize the use of the dams for energy generation and other water uses.

While indeed climate change and the need to control greenhouse gases play favourably to the development of new hydropower projects, funding has been a major constraint historically. It has been argued that some of the major impediments to the participation of the private sector in hydropower projects include lack of legal framework in the basin and energy tariffs that are not cost-reflective. SAPP and its members are in the process of effecting changes to make the region more attractive to private investors. Nevertheless, SAPP significantly relies on the member states' development plans as the institution has not been mandated to lead the development of energy in the region on behalf of the member states. This makes the need for a rigorous legal framework covering SADC members all the more important in order to protect investments, particularly hydropower projects which have long gestation periods.

Funding for developments in the water and energy sector in the basin has been complicated in the past, owing to a number of factors including: the changing environmental discourse and priorities; an increasing shift towards a regional approach to environmentally related programmes; and the need for good governance, among others. Furthermore, the need for rigorous environmental impact assessments has not made it easier for the basin states to acquire financial support where technical capacity has been lacking in some areas. As a result of these issues, funding has been less forthcoming from the traditional western donors including international finance institutions like IMF and the World Bank. The participation of China and its preference for bilateral agreements therefore has implications for the Zambezi Basin countries and particularly ZAMCOM. As economic capacity to develop water resources increasingly becomes tilted in favour of the few states where China has enterprises, the need to coordinate these developments by considerably involving other basin states may be seen as a hindrance to development. Hydropower developments already have long gestation periods and further delays arising from consultation with other basin states may be deemed undesirable. Particularly where such developments are proposed on tributaries that are solely located in one country, states may be discouraged from such consultations.

The establishment of the Southern Africa Power Pool (SAPP) creates a new market for potential hydropower projects in the basin. Strong arguments for cheap and clean energy and the rapid depletion of energy reserves in the SAPP necessitate the rapid development of new energy sources, including hydropower projects. Both the governments of Zambia and Mozambique want to take advantage of this development to boost their economies through power exports. Based on project descriptions, it is very unlikely that these two countries will pool their resources to attain efficiency and increase interdependency within the development of hydro-electric power projects. A study conducted by the World Bank in 2010 highlighted the potential gains of harmonising energy projects in the basin. Whether states in the basin will choose that path is yet to be seen. Nevertheless, what is clear is that with financial backing from China, increased economic activities and industrialisation as well as the escalating power demand in the SADC region, these new projects are less risky to undertake.

These factors may represent the risk of riparian states preferring a nationalistic approach particularly on tributary rivers solely located in a riparian state.

The high cost of energy imports currently limit power interconnections. This is particularly true where the states in question have the potential to develop HEPs nationally. The Malawi-Mozambique interconnection failed to proceed even though it was in its advanced stages, on the grounds that the cost of importing electricity was prohibitive. With unconfirmed reports pegging the cost of importing electricity at 1.2 million US Dollars monthly for 200 MW of electricity, the government of Malawi instead opted to develop the Kapichira Falls phase II at a cost of 55 million US Dollars. The project received financial backing from China and the China Gezhouba Group Corporation, a Chinese SOE, was responsible for the technical side of the project. As a result of the commissioning of the Kapichira Phase II project, Malawi added 64 MW of electricity to its power grid as of January 2014. From these figures, it is apparent that the cost of importing electricity for four years is equivalent to developing own power even though at a fraction of the power that was to be imported. Nevertheless, the flat rate common in power purchasing agreements may have justified the choice to develop own resources in Malawi. This is because such agreements rarely take into consideration the demand curves in the importing country, and for Malawi, the demand for power outside the peak periods is significantly low and hence does not justify the import of 200 MW of power. Nevertheless, the government of Malawi still intends to interconnect with Mozambique and purchase 50 MW of electricity (GoM 2014).

The flow rate demands that hydro-electric power plants place on the water system has also influenced how water resources have been controlled in the basin. Dams have mostly been single-purpose in design and operation and in several incidences have caused harm to other uses and users. Several scholars including Scudder have attributed the devastating floods of 2000 that killed and displaced a lot of people in

Mozambique to the lack of collaboration between the dam operators and other sectors. Moreover, dams have been operated in such a way that consideration for other uses and users is minimal since the central focus in dam operation is on storing water for energy production and safety of the dam. In this way dams have been underutilized and an important opportunity to maximize the benefits of such costly infrastructure has been lost.

As developments increasingly take place in the energy sector, the need for basin-wide planning is ever important. This places ZAMCOM right at the centre of water resources management in the basin. If ZAMCOM is to be effective, the riparian states must cooperate. As per its mandate, ZAMCOM needs to be a hub for coordination with other important institutions in the basin such as SAPP and other environmental agencies. This is critical now when, as a mitigation strategy to impacts of climate change, the agricultural sector is being transformed through agricultural intensification and extensification. These changes mean that water use and abstraction will increase through irrigation. This may increase competition between the two sectors, since increased water use for irrigation will negatively affect the system performance of hydropower plants if the uses are not well harmonized. This competition may be worsened by climate change as some of the climate change models indicate that water resources in the basin may be negatively affected. Harmonisation of the water resources in the basin is therefore critical in order to increase water use efficiency and allay potential conflicts among the riparian states. This calls for the key role of ZAMCOM, a third party organisation, to ensure that there is not only coordination between different uses but different states and users as well

Increased cooperation among the riparian states will require close coordination or joint development of water resources. World Bank studies in the basin have indicated that firm energy can be increased by seven percent in the basin by operating the different power stations as a system even in the absence of new developments. The study in fact recommends multilateral development of energy resources either at basin level or at sub-basin level. An important aspect to this multilateral development is that the issues involving the rights and responsibility of each state are clearly spelt out and incentives available to each state can easily be assessed. This is vital since the oversight of legal instruments in the basin to adequately address property rights has hindered execution of international water projects. The failure on the part of the government of Malawi for instance to recognise the asymmetric incentives in the development of the 2005 proposed Shire-Zambezi waterway has limited the potential to develop the waterway in the recent past. While the project was of prime importance to the government of Malawi, it was not the same with the government of Mozambique with its coastline. In this navigational project, the geographic advantage rested with the government of Mozambique, and unless incentives were restructured, the participation of the government of Mozambique was unlikely. The construction of a river port in Malawi in 2010 before carrying out the feasibility study as suggested by the pre-feasibility study was also problematic. The feasibility study importantly clarifies opportunities and challenges involved in carrying out a particular project as well as identifying incentives for participation in the project. States may then use this information for negotiations and restructuring of incentives to create a win-win situation.

Relying on works by Dinar (2008), Dombrowsky (2007), Toset et al. (200), and Barrett (1994) among others, this thesis argued that unless the states in the basin acknowledge the different incentives that exist in the basin as a result of geographic asymmetries, the proposed projects would be unrealistic as incentives would not be restructured to secure the cooperation of those states that would have otherwise little to gain from a project. Acknowledgement of this geographical fact would lead to more coordinated and judicious development of water resources in the basin. This is important since the lack of a third party institution to enforce states to bind to their agreements require as Barrett argues that treaties themselves are self-enforcing.

6.5 Summary of main lessons learned

Generally, using Tvedt's water-society systems concept (Tvedt 2015; Tvedt & Coopey 2010), what is clear from this study is that the hydrologic cycle, that is the way water moves in the basin, has been altered to a certain degree through water resources development, and particularly hydropower developments and irrigation projects. It is a fact that hydropower plants in the basin account for 10 per cent of evaporation of the available water. Moreover, agricultural intensification and extensification as well as new hydropower projects will increase evaporation rates in the basin through the increase of water surface area. What this implies is that our understanding of the hydrological system in the basin cannot be complete without taking into consideration the hydro-social changes. The ontological approach to studying water in the society must therefore acknowledge the fact that water exists in nature as a product of nature and social factors, but also exists in society as a product of social factors and nature (Tvedt 2015). Besides, the way water moves, its surface area, timing of flow and water quantity changes at any given time interacts with the broader environmental and climatic characteristics i.e. wind movements etc. How the past and current water engineering projects and their associated effects on hydrologic characteristics in the basin are going to interact with and possibly influence climatic conditions in the basin is subject to further studies. This close interaction between the social and the natural at the centre of societal existence is what necessitated the use of water-society systems conceptual framework. This concept has also been used to avoid looking at water as an obvious factor or making it passive in the analysis but rather to demonstrate why the failure to recognise water as an active part either in analyses or cooperative framework agreements hinders mutual cooperation. In other words, the use of the concept in this thesis has helped the thesis avoid being 'nature-centric' or 'anthropocentric.'

It is also apparent that the Zambezi River basin states have fashioned some of the water agreements for strategic political reasons, consistent with Barrett's strategic interaction concept. Concluding water agreements on the account of political relations, which is in line with the findings by Wolf et al. (2003) as well as Conca et al. (2003)

that states cooperate over water if they cooperate in general, stemmed from the need to cooperate in order to advance the liberation struggle in Southern Africa. The downside to that has been that water issues have not been central in as far as agreeing on specifics such as rights and responsibilities of the states, consideration of geographic asymmetries, issue linkage, and side-payments. The ZACPLAN was specifically analysed to bring to light these shortfalls. Moreover, most of the agreements in the Zambezi River Basin and the SADC region as a whole do not contain conflict-resolution mechanisms. Instead, such issues are supposed to be referred to the SADC Tribunal for resolution. As Giordano and Wolf argue, reinforcement of these agreements, including the ZAMCOM agreement, ought to incorporate conflict resolution mechanisms in order to present a clear picture of how conflicts are supposed to be mitigated and resolved so as to bolster cooperation and treaty compliance.

The fact that water agreements have indeed been concluded in the basin, even though critical issues regarding water management in the basin have been side-lined, begged the use of strategic interaction in international relations in order to explore how the states have successfully concluded such agreements. More specifically, the concept of strategic interaction was critically used to understand how states enter into agreements but also what opportunities exist to enhance international water cooperation in the Zambezi River Basin and beyond. Historically, states have linked water projects or institutions to political goals in the Zambezi Basin. While that has allowed increased participation of the riparian states in the conclusion of treaties, it has never provided a solid foundation for addressing water issues. Neither has it provided a solid platform for sustained commitment to treaties, particularly as the political configuration changes. This is consistent with the findings of Green Cross International (2000) with regards to the downsides of overly politicising water management. Based on the mandates and functions of institutions such as ZAMCOM, these institutions may face challenges with regard to sustaining treaty compliance. For the simple fact that ZAMCOM does not address property rights nor adequately acknowledges the geographic asymmetries that exist, restructuring of incentives is a non-starter.

Consequently, it is not easy to secure compliance by those states that do not seem to benefit much from the treaty.

After all, states are likely to cooperate if cooperation generates greater benefits than non-cooperation i.e. unilateral development of water resources. This is the reason why ZAMCOM, apart from providing guidelines on international water resources management, has to focus on and encourage joint construction projects in the basin in order to stimulate cooperation on international water management. One key factor for projects, particularly construction projects, is that asymmetries are acknowledged and incentives are restructured to create a win-win situation for the riparian states involved. This promotes treaty compliance. Furthermore, in construction projects, issue linkage may be easily facilitated as important issues are brought to the table by the riparian states. Nevertheless, as Dombrowsky (2007) suggests, various issues within the water sector may be more easily linked than those outside the sector, since linking water issues to other sectors may challenge the restructuring of incentives. The opportunity to enhance cooperation and mutual interdependence exists now in the basin. Climate uncertainty, increasing demand for cheap and clean energy as well as power pooling through power interconnection have created a market for potential hydropower projects. Furthermore, changes to agricultural production through increased irrigation activities require closer cooperation of the states in order to allay potential water-related conflicts. Depending on how they approach these opportunities, cooperation in the basin can be greatly enhanced. Otherwise, the basin states may continue to have a situation where existing treaties are not supported by policy adjustments at the national level. That may promote non-compliance to treaties in the long term.

Even though political interests have failed to provide a sound basis for international water management, they have nevertheless enabled conclusion of important legal instruments in the basin and the SADC region to allow management of international waters. These legal instruments include both the 1995 SADC water protocol on shared watercourses and the 2000 revised SADC water protocol on shared watercourse systems. These protocols have led to the establishment of river basin organizations such as ZAMCOM which provide a starting point for enhanced cooperation and/or resolution of conflicts. As Wolf et al. (2003) argue, this may be an important milestone since treaties generally are resilient and in the case of the Zambezi River Basin may become the foundation where more concrete and specific agreements are made whether at the basin or sub-basin level.

By reconstructing the evolution of international water management in the Zambezi River basin in a historical-geographical perspective, and by following hydropower developments, one thing also becomes evident. There is less certainty of dams in addressing the effects of climate change as history has shown that even with dams, natural hazards still occur owing to long periods of drought or heavy precipitation. In this light, as Tvedt (2015) argues, the Zambezi River is not totally controlled while at the same time not completely natural. Nevertheless, hydropower developments will continue to be at the centre of the future developments of the entire region. The study however casts doubt on the evolvement of future water relations in the basin. The fact that Zambia was reluctant to join ZAMCOM due to a number of concerns, not least the lack of considerations for hydrologic contributions in the agreement raises questions regarding the nature of cooperation among the riparians in the long term. This is particularly true if Zambia’s concerns have not been resolved. It also casts a shadow of doubt on what actions states may take if ZAMCOM fails to deliver to their benefit, particularly those that perceive to gain less from the agreement. Results here also highlight that the conclusion of basin-wide treaties has not been accompanied by policy adjustments at the national level required to make those instruments succeed. It is unclear whether the commissioning of new dams for hydropower will intensify coordination among states and different users. It is also uncertain whether the new dams will be multipurpose in design and whether basin states will develop mechanisms to coordinate the operation of both old and new dams as a single system.

So far, dams continue to be operated for a single purpose and in the interest of a particular country. As such, dams continue to be underutilised and an important opportunity for improved water use efficiency and enhanced international water cooperation is lost. Future studies on international water management in the Zambezi River Basin may need to explore how the basin states have resolved the question of geography and politics and how that shapes future hydro-politics in the basin.

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