

ADVANCING ON THE NILE?

Examining the effects of the Nile Basin Initiative on national water policy in the Eastern Nile Basin



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Eastern Nile Basin**

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EXECUTIVE SUMMARY

This research takes a closer look at one of the most current natural resource conundrums dealing with transboundary waterways, the Eastern Nile River Basin. Composed of Egypt, Sudan and Ethiopia, the Eastern Nile River Basin has been an area of contention over water quantity allocations for centuries. International law has been lacking in the dispute. According to Wolf (1999:4), “international water law is ambiguous and often contradictory, and no mechanism exists to enforce principles which are agreed upon”. Keeping this in mind it comes to no surprise then that the current status quo is that each transboundary river basin is managed through its own individual protocol. What happens when the protocol is informal, i.e. non-legally binding? This research aims to take this question a step further by investigating the influence of these informal management protocols on the national water policies of the riparians involved. How often are the informal protocols reflected in national legislation? The Nile Basin Initiative (NBI) was launched in 1999 as an effort to establish total basin cooperative management of the Nile River Basin. The informal NBI was created as a forum to help solve riparian issues and manage the basin of one of the world’s hotspots for potential water conflicts.

The NBI is focused on achieving socio-economic development of the region as well as equitable use of the Nile. The mission statement reads, “To achieve sustainable socio-economic development, through the equitable utilization of, and benefit from, the common Nile basin water resources” (NBI, 2009). As of today the NBI has been in existence for over 10 years. Each of the three riparian states of the ENB has written national level water policy after the implementation of the NBI in 1999. In order to explore the progress made by the NBI in the national water policies of the ENB, this research has the following objective:

To assess the value and effectiveness for cooperation of political commitments in the absence of legal treaties in transboundary river basins through exploring the national water policies of the Eastern Nile Basin in terms of achieving the objectives presented in the Nile Basin Initiative.

The above research objective leads to the following research question and sub-questions:

R1: *To what extent have the national water policies of the Eastern Nile Basin been influenced by the policy objectives of the Nile Basin Initiative?*

S1: *In which way can the influence of the NBI be assessed?*

S2: *To what extents have the past national water policies contained the NBI Policy Objectives prior to the NBI agreement?*

S3: *To what extent do the current national water policies contain the NBI Policy Objectives?*

S4: *Do alternative underlying factors exist that can be identified for explaining the perceived relation between the NBI and said policies?*

Each sub-question is answered in successive order utilizing a framework created from the five NBI Policy Objectives, the overall policy goals of the NBI. Policy contents indicators are then created as a means to measure the NBI Policy Objectives against the content of the current Post-NBI water policies of Egypt, Sudan, and Ethiopia. These indicators are taken from the growing field of Integrated Water Resources Management (IWRM) to create a final assessment framework.

The Pre-NBI and Post-NBI water policies for each of the three countries are compared with the final assessment framework, for a total of six analyses. The aim is to discover if and

how the national water policies have changed since the NBI was implemented, and if the Post-NBI water policies do indeed contain the goals set forth in the NBI Policy Objectives. In other words, the analysis shows to what extent each riparian’s international commitments to water management are reflected within their national policies. This is known as Goal Attainment. Below in Table A, the percentages of policy contents indicators that each riparian’s Pre- and Post-water policy contains is displayed.

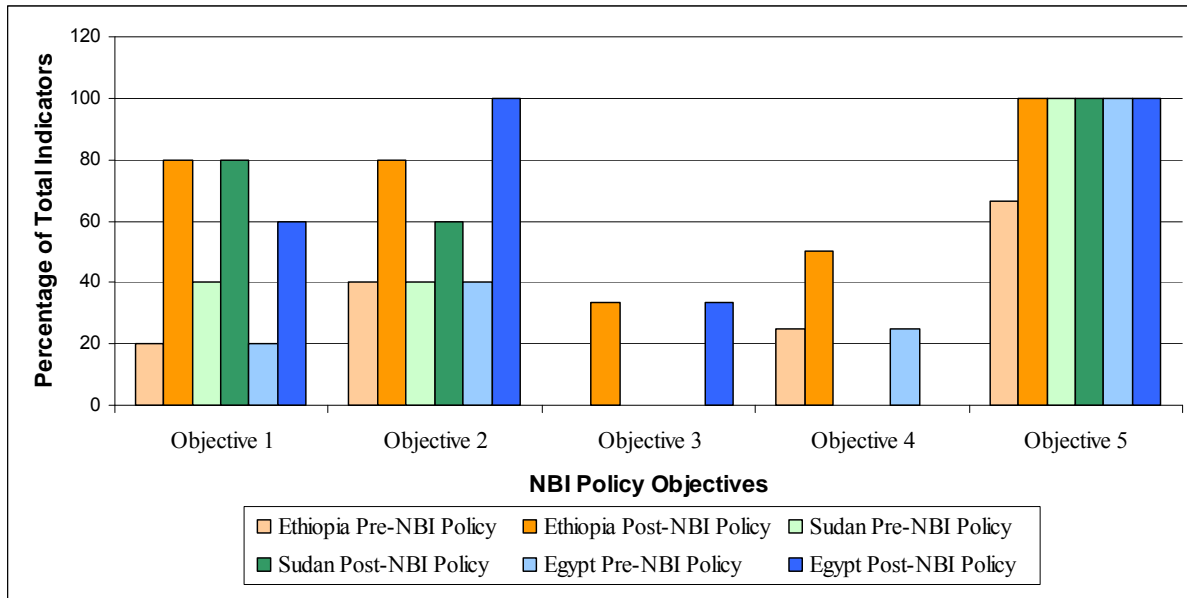


Table A: Indicator Presence According to NBI Policy Objectives for Pre- and Post-NBI Water Policies of the ENB

As shown, Ethiopia displays an increase in Goal Attainment for every NBI Policy Objective. Sudan shows an increase in two Objectives, while maintaining 100% Goal Attainment in the 5th Policy Objective. Zero Goal Attainment is achieved in the 3rd and 4th NBI Policy Objectives. Egypt shows an increase in Goal Attainment in three Objectives, maintains a 100% score in Objective 5, and shows a decrease in Objective 4 as compared to the Pre-NBI water policy. When taken as a whole however, all three countries show an overall increase in Goal Attainment in their Post-NBI water policies.

To determine NBI influence on this showcased Goal Attainment, alternative explanations are identified, discussed and ultimately accepted as plausible reasons for the Goal Attainment increase. Global IWRM adoption, environmental urgencies and population growth are given as credible catalysts for the increase in Goal Attainment, refuting possible influence from the NBI on the current water policies of the ENB riparians. Hence the answer to the main research question is, little to no influence.

This research concludes with a discussion as to why the NBI has not been influential on the national water policy contents of the ENB. Unilateral thinking fueled by centuries of mistrust, the overreaching hegemonic power of Egypt, a disproportionately developed professional and technical capacity for water resources management among the riparian states, and internal civil strife are identified as possible contributors to the lack of influence. Limitations of the research include inherent selection bias of the policy contents indicators as well as data availability issues that plagued every stage of this project. Partially due to these limitations, many areas exist for further research. The process for the NBI to become a legally binding Nile River Basin Commission is currently unfolding and is now at a stalemate between Egypt and Sudan versus the remaining seven upstream riparians. Lastly, recommendations are given for improving the impact of the NBI on the national water

policies of the ENB. They include a new water allocation treaty as well as the creation of a reservoir in Ethiopia and the dissolution of Lake Nasser in Egypt. It is argued that these actions will relieve some of the water stress felt by all the riparians by creating a greater volume of water resources, thus alleviating the mistrustful competitive nature held by the riparians towards each other. Only then will transboundary cooperation be an integral component of national-level water policies in the ENB.

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ABBREVIATIONS LIST

ARE	Arab Republic of Egypt
AUC	American University in Cairo
BCM	Billion Cubic Meters
CFA	Cooperative Framework Agreement
CIA	United States Central Intelligence Agency
CIDA	Canadian International Development Agency
ENB	Eastern Nile Basin
ENSAP	Eastern Nile Subsidiary Action Programs
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
Hydromet	Hydrometeorological Survey
IBRD	International Bank for Reconstruction and Development
IWRM	Integrated Water Resource Management
LSP	Letter of Sector Policy, Ethiopia
MDG	United Nations Millennium Development Goal
MoI	Ministry of Irrigation (now defunct), Egypt
MoIWR	Ministry of Irrigation and Water Resources, Sudan
MoWR	Ministry of Water Resources, Ethiopia
MWP	Master Plan for Water Resources Development and Use, Egypt
MWRI	Ministry of Water Resources and Irrigation, Egypt
NBI	Nile Basin Initiative
NBTF	Nile Basin Trust Fund
NCS	National Comprehensive Strategy of 1992, Sudan
NELSAP	Nile Equatorial Lakes Subsidiary Action Programs
NGO	Non-Governmental Organization
Nile-COM	NBI Council of Ministers
Nile-SEC	NBI Secretariat
Nile-TAC	NBI Technical Advisory Committee
NWRP	National Water Resources Plan 2017, Egypt
RIDMP	River Integrated Development Master Plan, Ethiopia
SNWP	Sudan National Water Policy
Tecconile	Technical Cooperation Committee for the Promotion of Development and Environmental Protection of the Nile Basin
UNDP	United Nations Development Programme
UNEP	UN Environmental Programme
WB	World Bank
WRMP	Water Resources Management Plan, Ethiopia
WSS	Water Sector Strategy, Ethiopia
WUA	Water User Association

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Appendix 1

1. INTRODUCTION

1.1 Transboundary Water Management as an International Challenge

In the words of Campbell (2007:583), "...managing river basins is not rocket science—it is more difficult than that". Water throughout history has been an impetus for conflict, as well as cooperation. According to the Transboundary Freshwater Dispute Database Project¹, since the year 805, there have been 3,600 water treaties signed and only 7 minor conflicts (Hamner & Wolf, 1998). Hence, transboundary waterways have overwhelmingly led to a greater number of instances of cooperation than conflict. However, hotspots currently exist that the international community is particularly interested in watching for the conflict potential is high; those primarily being the Aral Sea, Jordan River, Tigris-Euphrates system, and the Nile River (Yoffe et al., 2003). These transboundary systems all lie within arid areas, contain multiple states and have a history of unilateral development leading to tensions between the riparians.

While there currently exist over three hundred international water treaties in the world, coordinated and integrated management provisions of the international water bodies is rare, especially in the Third World (Elhance, 1999). These treaties and agreements often address two main concerns: water quality and water quantity allocations. Water shortages due to environmental factors and overconsumption are increasingly an issue of global concern. The proposed solutions found in agreements and treaties to solve these issues are even more complex. Transboundary rivers are no exception and can be more complicated due to upstream/downstream dilemmas of usage. From a legal standpoint, a river is said to be international, or transboundary, if a riparian state does not have sole control over the waters contained within the river (Kliot et al., 2001).

According to Wolf (1999:4), "international water law is ambiguous and often contradictory, and no mechanism exists to enforce principles which are agreed upon". Keeping this in mind it comes to no surprise then that the current status quo is that each transboundary river basin is managed through its own individual protocol. What happens when the protocol is informal, i.e. non-legally binding? This research aims to take this question a step further by investigating the influence of these informal management protocols on the national water policies of the riparians involved. How often are the informal protocols reflected in national legislation? The Nile Basin Initiative (NBI) was launched in 1999 as an effort to establish total basin cooperative management of the Nile River Basin. The informal NBI was created as a forum to help solve riparian issues and manage the basin of one of the world's hotspots for potential water conflicts and is thus the focus of this research.

1.2 Eastern Nile River Basin

The Nile River is the longest river system in the world, measuring 6,671 kilometers from its most distant source in Burundi flowing northward to the Mediterranean Sea (Swain 2008: 202). The Nile River basin covers an area of approximately 3.1 million km² of which 3% are wetlands, 3% open water, 2% is covered by forests and 1.4% is irrigated land (NBI, 2001). It is composed mainly of the White Nile (sourced in Burundi) and the Blue Nile (sourced in Ethiopia). The two join together in Khartoum, Sudan to form the infamous Nile that flows through Egypt (See Figure 1). Ten nations are within the Nile basin catchment area: Rwanda, Burundi, Tanzania, Democratic Republic of the Congo, Kenya, Uganda,

¹ The database is a compilation of water related treaties and case studies and is an on-going project of the Oregon State University Department of Geosciences and in collaboration with the Northwest Alliance for Computational Science and Engineering, <http://www.transboundarywaters.orst.edu/database/>

Eritrea, Ethiopia, Sudan and Egypt. Despite having ten riparians, the Nile has a relatively low flow for its length with an average annual discharge of 84 billion cubic meters (BCM). To put this in perspective, the Niger River has 9 riparians and a smaller catchment area of 2.2 million km², but with more than double the average annual discharge of the Nile with 180 BCM (CIA, 2010).



Figure 1: Map of Nile River Basin Area
 Source: www.africanwater.org/nile.htm (2001)

Approximately 300 million people live within the basin area and over half are dependent on the Nile as a water source. Current uses of the Nile by the riparian nations include irrigation, hydroelectric energy generation, inland navigation, rural and municipal water supplies, industrial water supplies, recreation and tourism, aquaculture, surface water supplies and groundwater recharge. The entire Nile basin can be said to be composed of the White Nile Basin, or Equatorial Lakes Region, as well as the Eastern Nile Basin (ENB). The ENB represents the nations of Egypt, Sudan and Ethiopia. They are in the most precarious of positions as they rely upon the Nile as a water source to a greater extent than the remainder of the Nile Basin. The three countries are mainly fed by the waters of the Blue Nile that originate in the Ethiopian highlands. A staggering 86% of the total Nile flow received in Egypt is contributed from the Blue Nile, with the remaining 14% attributed to the White Nile, sourced from Lake Victoria (Swain 1997: 675, see Figure 2).

The Blue Nile is at the mercy of seasonal rainfall in Ethiopia, which in turn determines the flow for the downstream riparians of Sudan and Egypt. Periods of drought or a disappointing rainy season can wreak havoc on the three countries. On average 85% of the annual flow of the Blue Nile occurs between July and October (Woodward et.al, 2007). As can be seen below in Figure 2, the majority of the Nile flow occurs in the late summer months of August and September from the Atbara and Blue Nile (Abbay River) rivers that originate

in Ethiopia. Figure 2 clearly demonstrates the importance of the Ethiopian sourced waters to the main flow of the Nile in comparison of the contribution made by the White Nile. In contrast, the White Nile basin area which the remaining riparians utilize receives a more steady supply of rainfall.

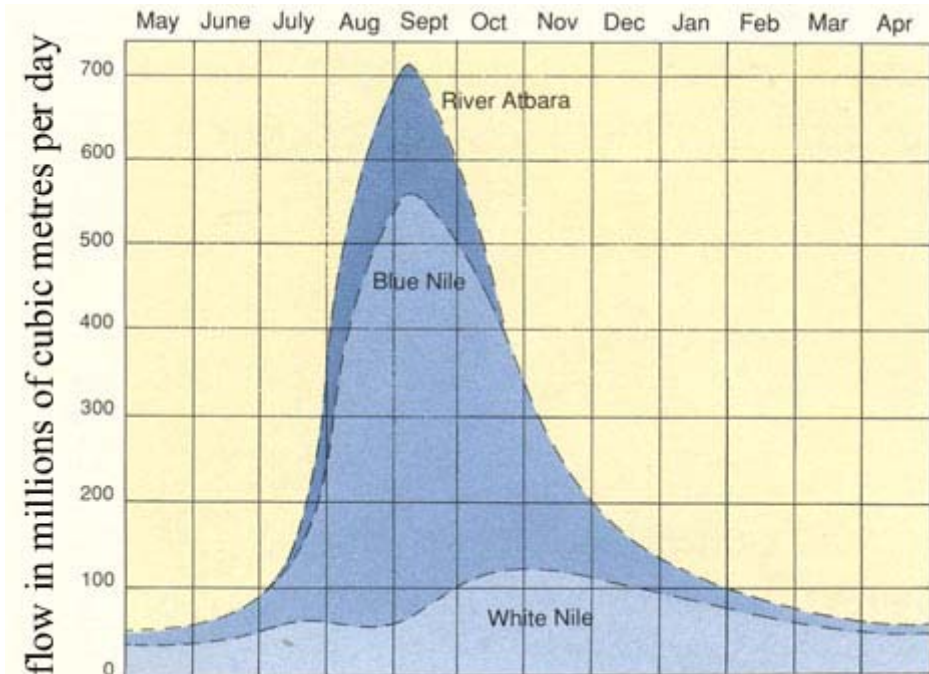


Figure 2: Yearly flow discharge of three main tributaries of the Nile River, measured at Khartoum.

Source: <http://www.mbarron.net/Nile/flowrate.jpg>

Influxes do naturally occur of course, yet not to the scarce proportions of the Blue Nile. The riparians of the White Nile are not faced with the same water scarcity situation that the Blue Nile riparians are. Ethiopia, Sudan, and Egypt are also the most heavily populated nations in the basin which leads to a greater potential for water use conflicts. By July of 2009, the population of the three nations alone is expected to exceed 209 million, with an average growth rate of 2.45% per year. Combined with an average real GDP growth rate of 6.97% the three nations' water needs are continually expected to increase (CIA, 2010). Climate change has exacerbated the occurrence of droughts and the expanding of the Sahara Desert due to desertification which in turn only increases the dire need for water in the region. Environmental concerns have also increased in recent times. As the riparian nations strive to industrialize, waste water and contaminants stemming from industrial activities are leading to increases in Nile pollution levels.

Political instability is another characteristic of the region that has the power to affect how the river is used. There is currently no agreed upon regime or treaty governing the actions of the three states. According to Thomas Homer-Dixon (2002), the Nile River is one of the "few international rivers that has the potential to provoke armed conflict between its riparian nations" for it sets up the scenario in which the downstream riparian is highly dependent upon the river and is strong in comparison to the upstream riparians (293). Hostile conditions have permeated the region over Nile water usage, particularly between Egypt and Ethiopia. Sudan does not currently present a threat to Egypt; quite frankly it does not have the economic or political means necessary to do so. Egypt is chiefly the most protective of its share of the waters, for it solely depends upon the Nile for survival and is the most vulnerable

to other riparians' actions. Egypt has been known to take extreme measures to prevent Ethiopia from developing projects that could retract water from the Nile flow including instigating conflicts between Ethiopia and its neighbor Eritrea (Kendie, 1999; Swain, 1997). With the largest and strongest military in the basin, as well as the largest economic prowess to work with Egypt has on multiple occasions threatened with military force to protect its interests in the Nile River. Actual conflict has never occurred yet as the late President Anwar El Sadat stated, "Any action that would endanger the waters of the Blue Nile will be faced with a firm reaction on the part of Egypt, even if that action should lead to war" (Wright, 1972: 44). The seriousness of the matter is shown through the fact that the Nile waters are a matter of national security in Egypt. Hundreds of years of political conflict and internal strife have scarred the region with a hostile, mistrustful and insecure attitude towards working together for multilateral use of the river.

1.3 International Cooperation in the Eastern Nile Basin

Each of these three riparians has major stakes in the Nile and desires to develop its resources as how they see fit. Unilateral development projects dominate the region. Multilateral cooperation between the riparians on river development projects has failed to be realized in large part due to the conflicts over the rights of use between Egypt, Sudan and Ethiopia. Egypt and Sudan both claim 'historical rights' of the Nile meaning that they "have built their civilizations on the Nile for 7,000 years...both countries have priority over others" (Kendie 1999: 150). On the other hand, Ethiopia claims that it has 'natural rights' to the water as 86% of the water that Egypt and Sudan consume originates within its borders. These rival discourses can best be summarized by Ines Dombrowsky and David Grey (2002),

"Downstream countries typically take the position that they have become dependent on the river flows and have acquired rights to the quantity of the water they have used in the past. Later-developing upstream countries contend that they did not have the need or the capability to develop the waters in the past, and that the strict application of a no-harm rule forecloses, at least unreasonably limits, their right of development"(125).

Ethiopia is thus contending that they too, have millions of people to feed and since the vast majority of the Nile's waters originate within their borders, they too have an equal right to exploit it to the best of their ability. These competing discourses are represented in the legally binding treaties that presently "govern" the region. There have been multiple agreements, informal and formal, concerning the use of water over the past 200 years. Most of these are no longer valid as they were created when Africa was largely under the control of European colonialism. Two significant treaties, and one agreement, will be discussed here: the 1929 Nile Waters Act and the 1959 Agreement for the Full Utilization of the Nile Waters, both of which are allocation based, as well as the Framework for General Co-operation between the Arab Republic of Egypt and Ethiopia of 1993.

The 1929 Nile Waters Act is between Egypt and Britain (Sudan was under British occupation at this time) and firmly established Egypt as the hegemonic power of the basin. The agreement specifically states, "...no irrigation or power works or measures are to be constructed or taken on the River Nile or its tributaries, or on the lakes from which it flows in so far as all these are in the Sudan or in countries under British administration, which would entail prejudice to the interests of Egypt" (Kendie ,1999: 147). Ethiopia however, was not and has never been a British colony therefore by legal definition, does not have to abide. The

1959 Agreement for the Full Utilization of the Nile Waters is an allocation treaty between Egypt and Sudan and pertains to the division of the waters between the two states. Studies have shown that the Nile has a yearly flow of 84 BCM. As per the agreement, Egypt was allocated 55.5 BCM, Sudan 18.5 BCM and the remaining 10 allotted for loss through swamplands and general evaporation (Kendie, 1999). The apparent flaw of this agreement is that it distributes the entirety of the river between Egypt and Sudan, bisecting complete control, while Ethiopia is not allocated a drop. It is important to note that no riparian nation apart from Egypt and Sudan has accepted this agreement as being valid, yet it is still legally binding fifty years later. The 1993 agreement between Egypt and Ethiopia states that both countries should not embark on any works on the Nile that could harm and affect other countries, as well as emphasizes the compliance with current international law. On a more encouraging note, the agreement does highlight the desire of both countries to consult and cooperate for the utilization of the Nile water to increase water flows and reduce losses via “mutually advantageous” projects (ARE & Ethiopia, 1993).

Over one hundred years of political conflict and internal strife have scarred the region with a hostile, mistrustful and insecure attitude towards working together for multilateral use of the river. The NBI is the end result of decades of previously failed Nile Basin organizations as well as a product of basin-wide talks and conferences held throughout the 1990's. Bilateral agreements (some formal, most informal) have taken place within the Nile Basin for hundreds of years between various riparian nations. Nile Basin cooperation began with the Hydrometeorological Survey (Hydromet) project in 1967, followed by Tecconile (Technical Cooperation Committee for the Promotion of Development and Environmental Protection of the Nile Basin). Also during the Tecconile meetings, forums known as the Nile-2002 Conferences were also taking place. A brief summary of each of these organizations that paved the way for the NBI are given here.

The Hydromet project was established in 1967 to provide a “better hydrological understanding of the upper basin” and the changing water levels of some of the Equatorial Lakes (Campbell, 2007: 572). Between the years of 1961 and 1964, Lake Victoria, as well as the other equatorial lakes, rose in height dramatically leading to massive flooding and people displacement. The cause was not known and hence the Hydromet project was born from the World Meteorological Organization, with Egyptian support to study the rainfall patterns in the upper Nile region (Waterbury, 2002). Even though the project was focused on understanding the upper basin states hydrology, Egypt and Sudan were full members of Hydromet from the beginning, with Ethiopia entering as an observer in 1971. Hydromet headquarters were established in Entebbe, Uganda. After 25 years the project ended and was replaced by Tecconile during the same year.

In December 1992, Tecconile was formed as a successor of the Hydromet project from the backings of the Canadian International Development Agency (CIDA), United Nations Development Programme (UNDP), Food and Agriculture Organization of the United Nations (FAO) and the World Bank (WB), with its secretariat again located in Entebbe. Initially Tecconile had six members: Egypt, Sudan, Rwanda, Tanzania, Uganda and Zaire. Ethiopia, Kenya, Eritrea and Burundi had observer status (Waterbury, 2002). Egypt's strategy for Tecconile was to promote multi-scale projects, some leftover and unfinished from the Hydromet era. These projects were mainly geared at the upper basin riparians and addressed a more efficient use of their water resources. However, Ethiopia, at the third meeting in Arusha, Tanzania in 1995, demanded that a framework for collaboration be established before any action on the ground was taken. This framework was to be based on “an agreed users' code, preferably based on principles of equitable use” (Waterbury, 2002: 79). A Panel of Experts was thus created from legal and water professionals of the riparian states to establish this framework, then known as the D3 Project.

Simultaneous yet independent to Tecconile were the Nile-2002 Conferences that functioned as a “forum designed to facilitate the exchange of views over Nile basin issues and thereby assist policy makers to explore possibilities of basin-wide cooperation on the development and management of the Nile’s resources” (Dinar & Alemu, 2000: 23). One of the main highlights of the Conferences was the presentation of country papers in which different riparians promoted their Nile interests and concerns to the other riparians. These conferences, in addition to the D3 Project led to the creation of the NBI, a replacement of Tecconile in 1999.

1.4 Nile Basin Initiative

The Nile Basin Initiative (NBI) desires to make way for a cooperative beginning. The NBI is focused on achieving socio-economic development of the region as well as equitable use of the Nile. The mission statement reads, “To achieve sustainable socio-economic development, through the equitable utilization of, and benefit from, the common Nile basin water resources” (NBI, 2009). The NBI organizational structure consists of the Council of Ministers of Water Affairs of the Nile Basin Countries (Nile-COM), the Technical Advisory Committee (Nile-TAC), and the Secretariat (Nile-SEC) located in Entebbe, Uganda (Swain, 2008: 209).

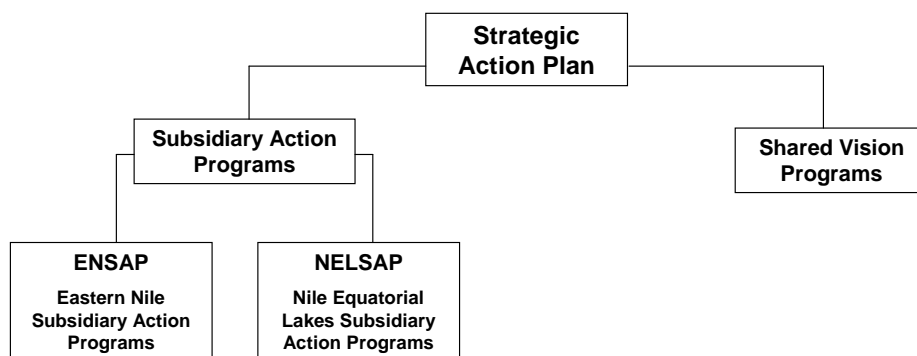


Figure 3: Organizational structure of NBI.

As seen above in Figure 3, the NBI combines two programs, the Shared Vision Program and the Subsidiary Action Programs into one Strategic Action Plan. The Shared Vision Program consists of eight grant based projects that strive to create an “enabling environment” for investments and the achievement of the goals brought forth in the mission statement (NBI, 2010). According to the NBI official website, six out of the eight projects have been completed while the remaining two are ongoing. The six completed are, 1) Applied Training Project, 2) Confidence-Building and Stakeholder Involvement Project, 3) Shared Vision Coordination Project, 4) Socio-economic and Benefits Sharing Project, 5) Transboundary Environmental Action Plan, 6) Efficient Water Use for Agriculture Project. The two ongoing projects are, 1) Water Resources Management Project, and 2) Regional Power Trade Project (NBI, 2010).

The Subsidiary Action Programs aim to plan and implement mutually beneficial water resource development projects throughout the basin and are divided into two sub-basin groups, the Eastern Nile Subsidiary Action Programs (ENSAP) and the Nile Equatorial Lakes Subsidiary Action Programs (NELSAP) (Nile-COM, 1999). ENSAP is an investment program organized by the governments of Egypt, Sudan and Ethiopia that focus on on-the-ground projects providing tangible benefits. Currently ENSAP consists of eight projects, 1)

Eastern Nile Planning Model, 2) Flood Preparedness and Early Warning, 3) Ethiopia-Sudan Transmission Interconnection, 4) Eastern Nile Power Trade Investment Study, 5) Irrigation and Drainage Project, 6) Watershed Management Project, 7) Baro-Akobo-Sobat-Multi Purpose Project and 8) Joint Multipurpose Program (ENSAP, 2010).

NELSAP on other hand consists of the governments of Burundi, DR Congo, Kenya, Rwanda, Tanzania, Uganda as well as Egypt and Sudan. The following twelve projects have been identified, 1) Natural Resources Management, 2) Enhanced Agriculture Productivity through Rainwater Harvesting, Small Scale Irrigation, and Livestock Management, 3) Fisheries Project for Lake Albert and Lake Edward, 4) Development of a Framework for Cooperative Management of the Water Resources of the Mara River Basin, 5) Kagera River Basin Integrated Water Resources Management, 6) Development of a Framework for Cooperative Management of the Water Resources of the Malakisi-Malaba-Sio River Basins, 7) Water Hyacinth Abatement in the Kagera River Basin, 8) Hydropower Development and Power Trade, 9) Rusumo Falls Hydroelectric Power Development, 10) Ranking and Feasibility Study of Hydroelectric Power in the Nile Equatorial Lakes Region, 11) Interconnection between Kenya and Uganda, 12) Interconnection between Burundi, DRC, and Rwanda, 13) Interconnection between Burundi and Rwanda, and 14) Interconnection between Rwanda and Uganda (NBI, 2010). These projects for both ENSAP and NELSAP are in various stages of implementation.

The umbrella Strategic Action Plan that encompasses the Shared Vision Programs, ENSAP and NELSAP, identifies five key objectives for achieving the mission statement of the NBI:

1. To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.
2. To ensure efficient water management and the optimal use of the resources.
3. To ensure cooperation and joint action between the riparian countries, seeking win-win gains.
4. To target poverty eradication and promote economic integration.
5. To ensure that the program results in a move from planning to action.

These objectives, known as the NBI Policy Objectives, were agreed upon by all riparian nations, including those of the Eastern Nile Basin. The last objective, To ensure that the program results in a move from planning to action, refers to the Cooperative Framework Agreement (CFA), the would-be first basin-wide international treaty for management of the Nile River and a replacement for the 1959 Agreement between Egypt and Sudan. An overview of the organizational structure and the inner workings of the NBI are best summarized by Aaron Tesfaye (2008):

“At the national level, each of the Nile Basin states has a national focal point that assumes a position of leadership for a particular shared program. For example, in hydropower, the focal point is a specialist based in the national hydropower electricity agency who works with other specialists from the same country to implement the Shared Vision Project. Thus, given that there are seven Shared Vision programs operating in the ten Nile Basin states and that each project has a different sectoral focus, a state involved in all seven shared

projects would have seven national focal points involving ministries of different sectors. These activities of the Program Management Units in each state are coordinated by a national NBI office funded entirely by the government of each country. In turn, these program units report to a Technical Coordination Committee, which provides strategic guidance. Finally, representatives from donors, the Nile Secretariat, and the World Bank meet periodically in order to meet needs as determined by the Program Management Units. Overall coordination of the seven Shared Vision programs at the basin-wide level is done by the Nile Secretariat on behalf of the Nile Council of Ministers and the Technical Advisory Committee. The Nile Secretariat handles only information sharing, coordination, integration, and monitoring and evaluation of programs. The Technical Advisory Committee reviews project portfolios and provides advice to the Council of Ministers, which, in turn, provides overall guidance on policy matters” (224).

The NBI has been largely supported by the international community since its inception and continues to be financially supported through the Nile Basin Trust Fund (NBTF) today. The NBTF was established in 2003, at the beset of Nile-COM and is administered by the WB. The NBTF is a funding mechanism that administers the funds donated from donor countries. Current countries and organizations that contribute to the NBTF are: Canada, Denmark, the European Commission, Finland, France, The Netherlands, Norway, Sweden, United Kingdom and the World Bank. Groups that donate but are not members of the NBTF are the African Development Bank, Germany, Global Environment Facility, Italy, Japan, Switzerland, UNDP and the United States (World Bank, 2010). The total estimated program cost is about US \$3 billion. Today, US \$150 million has been pledged and US \$130 million has been secured. Of this total program cost, \$14.4 million is funding from riparian governments (Nile-SEC, 2008). The monies of the NBTF are used to fund the various projects of the NBI including the Shared Vision Projects and the investment programs of ENSAP and NELSAP. A NBTF Committee shares the responsibility of monitoring the operation of the NBTF and making sure the funds are used wisely towards NBI programs. This committee is composed of representatives from the WB, riparian countries as well as the donor members and meets once a year in one of the basin nations (World Bank, 2010).

The NBI was established as a “transitional arrangement” until the riparians could agree on a permanent legal framework (part of the D3 Project, the CFA) that would in turn disband the NBI and create the Nile River Basin Commission (Swain, 2002: 302). It is the creation of this CFA that is currently hampering progress and stalling the creation of the Nile River Basin Commission. Rwanda, Kenya, Uganda, Tanzania, Democratic Republic of the Congo, Ethiopia and Burundi have endorsed the treaty, while Egypt and Sudan have not due to a wording dispute of Article 14b. Egypt and Sudan are demanding that the phrase “not to significantly affect the water security of any other Nile Basin State” be changed to “not to *adversely* affect the water security and *current uses* and rights of any other Nile Basin State”, presumably to protect their present water use projects (Cascao, 2008). Therefore the CFA has not yet been ratified by any country and is not legally binding at press time.

1.5 Problem Description

The culmination of the Shared Vision Program is the CFA. Once ratified, the CFA would be the first comprehensive legal treaty for the management of the Nile River to include all of the

riparian nations, with Eritrea acting as an observer. The end goal by ratifying this CFA is the formation of a permanent River Basin Commission with legal status (NBI, 2002).

Due to the fact that the CFA is not agreed upon, and thus not legally binding, the NBI currently acts as a recommendation for national water policy makers of Egypt, Sudan and Ethiopia. While all three countries are members of the NBI and have agreed to work towards the mission of equitable distribution and mutually beneficial development projects, there are no legal repercussions for not following through. Cooperation can be said to be downright necessary within the Eastern Nile Basin if further development is to take place. Egypt quite frankly, would cease to exist as a viable state if it weren't for the waters of the Nile (Pittman & McKinney, 2004). Until recently, the amount of water flowing to Egypt has not been threatened by developments in the upstream countries of Sudan and Ethiopia. Ethiopia in particular has vast hydropower potential within its mountains and valleys that have long been underdeveloped due to social, political and economic constraints; only 5% of its total surface water has been utilized (Arsano & Tamrat, 2005). Further developments in Ethiopia have long been desired but have been hampered by external causes such as military pressure from Egypt; Egypt fears any developments occurring upstream will detract from their water resources. Ethiopia's population is expanding and they can no longer afford not to utilize their share of the Nile. The need for the three countries of the Eastern Nile Basin to work together has become imperative for each of them to survive.

It thus becomes more evident how large a step the creation of the NBI was for this region. Egypt and Sudan have publicly accepted that Ethiopia deserves part of the Nile, but does their former attitude still pervade in the policy making arena? Does the same level of mistrust that existed in the past between Egypt, Sudan and Ethiopia continue to influence policy makers? Current information abounds with the formation of the NBI and its goals, yet current research lacks as to how the national water policies of each country are reacting and/or adjusting to the objectives that they each have agreed to uphold set forth in the Policy Objectives of the Strategic Action Plan. Are the national water policies of Egypt, Sudan and Ethiopia complying with the five objectives set forth in the NBI Policy Objectives? By filling in these knowledge gaps, the likelihood of future legal cooperation within the Eastern Nile Basin will be ascertained.

1.6 Research Design

1.6.1 Research Objective and Relevance

International river basins have various governing bodies which include local, municipal, regional, national, and international. This project will focus on the national level of government as a means for achieving international cooperation. According to Marty (1997, 2001), when dealing with international rivers national governments are better equipped with resources and better organized to negotiate with other key stakeholders. Bernauer (2002) goes a step further by asserting that cooperative agreements are more likely to be successful if they link up national level authorities. National level policy and legislation are considered to be the wishes and objectives of the national government, hence the content of the national water policies are of focus here. While there are ten riparian nations within the Nile basin, the importance of the water is not at the same level. The majority of Nile River water is indeed consumed by Egypt and Sudan and therefore cooperation in the core area of the Eastern Nile Basin is paramount for cooperation amongst the entire basin (Swain, 2002). The research objective of this study is thus the following:

To assess the value and effectiveness for cooperation of political commitments in the absence of legal treaties in transboundary river basins through exploring the national water policies of the Eastern Nile Basin in terms of achieving the objectives presented in the Nile Basin Initiative.

This research is significant for the nations of the Eastern Nile Basin, for Africa and for all transboundary river basins. The NBI represents a monumental step forward in the right direction of shared waterway management. Each country in the basin is currently or will be facing a dire situation of water shortages that have the potential to be exacerbated by climate change, drought and desertification. It has even been predicted that global climate change may reduce the flow of the Nile by 25% through altering the current precipitation and evaporation patterns (Elhance, 1999). The current trends of population growth and economic growth in the region will also stress the need for water. Assessments of the national water policies in accordance to the NBI's objectives is important to research to judge if the NBI is proving to be influential even though it is not legally powerful. The Eastern Nile Basin states need to work together and solve the water usage predicaments in order for a greater balance of power to exist in the region. Egypt has long resumed a hegemonic position and due to its economic and military supremacy over the other nations, has largely dictated the water allocations so as not to place any strain on itself (Elhance, 1999). To keep conflicts at bay, it is important to assess if the NBI is creating an increased equitable power structure between the nations. By comparing the national water policy objectives to the basin-wide objectives of the NBI, a sense of the cooperative spirit within each country will be discovered. This level of commitment may be indicative to future collaborative efforts of water management within the Eastern Nile Basin, and therefore deserves to be looked into.

The area is of historical and cultural significance to the entire world for it represents one of the regions where human civilization began. Ancient artifacts and monuments have provided the world with priceless knowledge and allure for centuries. These artifacts (those presently existing and those still waiting to be discovered) could face danger if military conflicts were to ensue over the right to water. The NBI aims to prevent these conflicts through collaboration and multilateral projects. The international community further needs to be concerned with the fragile political and social situations of the Eastern Nile Basin. Sudan has been embroiled in internal conflicts that have drastically impeded its ability to develop its Nile resources. Sustainable development of Nile resources is perhaps the largest goal of the NBI but without political stability of the region, it will be near impossible to obtain.

On a more local note, this research openly correlates to the Copernicus Institute and the Research Program on Environmental Governance for Sustainable Development of Utrecht University. The Research Program is divided into six empirical fields, the first one being Biodiversity, ocean and water management. Within this empirical field, emphasis is placed on, "A new step towards a more integrated approach to water management...to deal with the catchment area as a whole" as well as, "Researchers must give due attention to the international treaties...and how these are specified in national approaches, regulations and policy" (Copernicus Institute, 2009: 19). This research directly concerns both of these recommendations. The interactions between the riparian nations of the Eastern Nile Basin and the NBI are considered as a means for sustainable development. Without cooperation in the management of the Nile's resources, each country will find it difficult to continue to develop, let alone develop in a more sustainable manner. This research proposes to discover the value of international policies formulated to exacerbate sustainable development within the Eastern Nile Basin and is therefore a pertinent field of study on the multiple levels discussed above.

1.6.2 Research Questions and Framework

The above research objective has thus led to the following research question:

R1: *To what extent have the national water policies of the Eastern Nile Basin been influenced by the policy objectives of the Nile Basin Initiative?*

In order to fully answer the research question, the sub-questions below have been formulated that will guide the research:

S1: *In which way can the influence of the NBI be assessed?*

The following three sub-questions will be addressed for each country of the Eastern Nile Basin: Ethiopia, Sudan and Egypt:

S2: *To what extents have the past national water policies contained the NBI Policy Objectives prior to the NBI agreement?*

S3: *To what extent do the current national water policies contain the NBI Policy Objectives?*

S4: *Do alternative underlying factors exist that can be identified for explaining the perceived relation between the NBI and said policies?*

From now on, these questions will be referred to as: R1, S1, S2, S3, and S4. The research questions in turn provide a framework for guiding my research in a chronological manner, illustrated below in Figure 4.

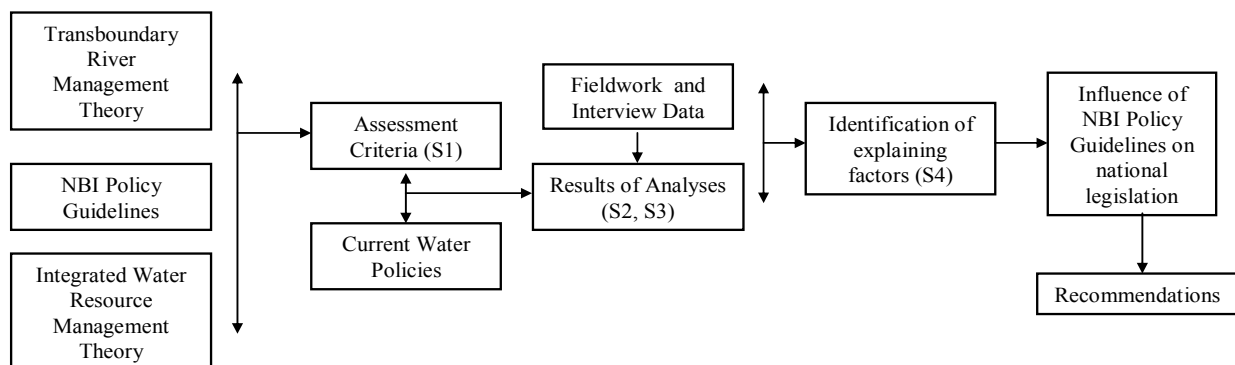


Figure 4: Research Framework²

Reading from left to right, the existing literature on transboundary river management and integrated water resource management (IWRM) will be examined. From this literature review, a set of indicators will be formed in order to measure the NBI Policy Objectives. These indicators will also be researched and identified for each objective as they pertain to national policy; thus S1 will be answered. These indicators will then be compared with the current or Post-NBI, as well as Pre-NBI, national water policies of each country; Egypt, Sudan and Ethiopia. Given these results, a further examination will be done as to why or why

² Format of research framework taken from P. Verschuren and H. Doorewaard, 1999. *Designing a Research Project*. Utrecht: Lemma.

not the national policies contain the established indicators, including possible alternative explanations for policy indicator presence. The degree of influence of the NBI will then be addressed by either accepting or ruling out these alternative explanations, answering the main research question R1. Finally, recommendations will be given, depending on the results, for increasing the value of the NBI through national water policy avenues within each country of the Eastern Nile Basin.

1.6.3 Research Strategy and Data Collection

In order to perform a comparative case study, data must be collected. Desk research, interviews and observations are the methods that are used here to obtain this data. In order to answer the main research question R1, the four sub-questions must first be answered. The first sub-question S1 will be answered by conducting a literature review from current journals and books dealing with transboundary river management. The following libraries were visited: Utrecht University Library (De Uithof campus) in Utrecht, Netherlands, American University in Cairo, Egypt (Main and Law Libraries), and the African Studies Library at Leiden University, Netherlands. Analyses of the current and past national water policies' content for each of the three countries are the direct objects of this research. Therefore the policies themselves, in document form, are the primary source of information in answering S2 and S3. Box 1 provides the water policies used as well as the appropriate sector of government responsible for its implementation for each country.

	Egypt	Sudan	Ethiopia
Post-NBI Policy	National Water Resources Plan 2017 (2005)	Sudan National Water Policy (2000)	Ethiopian Water Resources Policy and Strategy (2001)
Pre-NBI Policies	Master Plan for Water Resources Development and Use (1980)	National Comprehensive Strategy (1992)	Baro-Akobo, Tekeze, and Abbay River Basin Integrated Development Plans (1997, 1998, 1998) Letter of Sector Policy (1996)
Governing Body	Ministry of Water Resources and Irrigation	Ministry of Irrigation and Water Resources	Ministry of Water Resources

Box 1: Overview of past and present water polices in Eastern Nile Basin

While primary source information was desired, the original documents for Sudan's National Comprehensive Strategy as well as Ethiopia's Baro-Akobo, Tekeze, and Abbay River Basin Integrated Development Plans (RIDMPs) were not available. Due to data availability limitations, the NCS itself will not be used and secondary source information is used instead, primarily a summary of the NCS's application to the water sector written by Kamal Ali Mohamed, the Chairman of the Water Resources Organ Permanent Joint Technical Commission for Nile Water between Sudan and Egypt. For the Ethiopian Pre-NBI RIDMPs, the original RIDMP documents were not made available per order of the Ministry of Water

Resources in Addis Ababa. Secondary source information is thus used instead. It must be noted here that even secondary information on the RIDMPs was difficult to locate; every secondary source document that was found was used. The primary source document of the Egyptian Master Plan for Water Resources Development and Use was located in Cairo. Permission was granted to view the Executive Summary of the Main Report and not the Main Report which was the desired document. Therefore, secondary source information has been used to supplement the original document.

Many attempts were conducted in obtaining the aforementioned documents, yet none proved successful. After months of searching, at last it was thought the NCS of Sudan had been found at the African Studies Library at Leiden University in Leiden, Netherlands (their website listed that they had the document on microfiche); it was sadly not there. Upon arrival at the library, the librarian could not locate it in the microfiche files. The African Studies Library listed around 15 Sudan documents that they had on microfiche, but in reality, they only had approximately 6 on file. This was just one of the many attempts I made to locate the NCS, as well as the Ethiopian RIDMPs. The Library of the Ministry of Water Resources in Addis Ababa was contacted and was told that the only way to gain access was to visit the Ministry library in person and read them there as photocopies were prohibited. As much as this traveling was desired, financial constraints did not permit this. Finding secondary source data on the RIDMPs proved arduous as well. The majority of data found was of a technical nature, largely dealing with hydropower potential and production and to a lesser extent, irrigation potential and techniques. Efforts were made in obtaining stronger policy data for Ethiopia and Sudan in general. Numerous calls and emails were made to the Embassies of Sudan and Ethiopia while in Cairo, with no success. The Ministries of Ethiopia and Sudan in the Netherlands were also contacted but again with fruitless results.

Interviews with key persons were also a source of valuable information. Government officials from the Ministry of Water Resources and Irrigation of Egypt (MWRI), the Ministry of Irrigation and Water Resources of Sudan (MoIWR) and the Ministry of Water Resources of Ethiopia (MoWR) were contacted for country viewpoints. Dr. Hussam Fahmy, Vice Chair of the National Water Research Centre in Cairo and Dr. Mohamed El-Fetyany, an engineer at the Planning Sector of the Ministry of Irrigation and Water Resources, also in Cairo provided valuable insights from an Egyptian point of view. However, interviewing government officials responsible for the construction and implementation of the water policies proved difficult. Due to the contentious nature of the subject, the mistrust among the riparians towards each other, and the timing of this research, those contacted were hesitant to speak to me. Therefore, only officials from the Ministry of Irrigation and Water Resources in Egypt were willing to be interviewed. Those contacted in Sudan and Ethiopia declined to interview over the phone as well as via online questionnaire. Despite these complications, sufficient data was collected to be able to proceed and conclude this research.

Experts who have been studying the NBI and Eastern Nile Basin with helicopter views from such areas as international law, Arab culture and hydrology were sought after in providing insight for S3 and S4. Dr. Rick Tutwiler of the Desert Development Center at the American University in Cairo, as well as the now former AUC law professor Christine Anderson were interviewed and discussed the broader implications of the current hydro-political situation of the ENB. Researchers Dr. Ray Langsten and Moushira Elgeziri from the Social Research Centre of the American University in Cairo, Egypt (AUC) assisted in formulating the interview questions as well as provided advice and strategies for conducting research in Egypt. Questions for the semi-structured interviews were created based on the findings of the assessment indicators and with the help of, Zorn, T., 2005, *Designing and Conducting Semi-Structured Interviews for Research*, Waikato Management

School, as well as other such materials. These semi-structured interviews were conducted face-to-face during a month long fieldwork session in Cairo, Egypt.

1.7 Outline of Report

The remainder of this report is dedicated to answering each of the four sub-questions in a systematic manner before addressing the main research question. The following chapter will be focused on answering S1 with the desired outcome of creating an assessment framework upon which to measure the influence of the NBI on the national policies of the ENB. Next, one chapter will be devoted to each of the three riparian nations of the ENB where S2 and S3 will be answered for each of the three countries. The before and after NBI analysis of the policies is important to determine whether the policy contents have truly been influenced by the NBI or whether some other mechanism was at hand. The results will be given for the analysis of the national policies against the assessment framework for both the Pre- and Post-NBI era water policies. A discussion will then take place sequentially after these analyses where the alternative explanations mentioned in S4 will be identified and elaborated upon. This research step aims at establishing causality of the NBI by ruling out the alternative explanations as the mechanism behind the results of S2 and S3. Conclusions will then be made in accordance to the main research question R1.

2. BUILDING AN ASSESSMENT FRAMEWORK

2.1 Introduction

This section is dedicated to the formation of a theoretical framework on which to assess the influence that the NBI has had on national level water policy contents of the ENB states. The first sub-question to be answered is,

In which way can the influence of the NBI be assessed?

This question will be answered by creating an assessment framework that aims to measure the “amount” that the NBI has influenced the national water policy contents of the ENB states. The challenge here is to decide exactly how this can best be done. According to Bernauer (2002), there is no one complete list of criteria that assess international efforts towards effective transboundary river management; there is no agreed upon standard for the comparison of international rivers. It can be argued that it is not possible to construct such a list, given the variety of differences between river basins. Cultural, social, political, and ecological factors contribute to creating situations that are somewhat unique to each river basin. Gilbert White (1957) put it bluntly 60 years ago claiming, “...if there is any conclusion that springs from a comparative study of river systems, it is that no two rivers are the same” (160). Rivers that run through developing countries, such as the Nile, present particularly difficult management situations. Campbell (2007) identifies three difficulties that usually exist in developing country transboundary river basins that can make the management of these rivers more complicated than ones that lie within developed nations: lack of capacity and resources, need for development in the name of poverty alleviation, and a lack of inclusivity in governance. Depending on the situation, all resources may need to be focused on maintaining a livelihood. Public participation may not even be possible depending on the political situation. One thing that is clear for this research is that we are looking into one specific case, the NBI. Therefore it makes sense to develop assessment criteria from the content of the informal NBI itself. The remainder of this section will discuss the creation of this assessment framework taken from the language of the NBI.

2.2 NBI Policy Objectives as Assessment Criteria

The overall goals of the NBI are expressed in the NBI Policy Objectives. The NBI Policy Objectives are to act as “policy guidelines for taking the strategic action which is necessary to realize the potential of the Nile for the good of all” (Nile-COM, 1999). By being a member of the NBI, as all the riparians are, they have agreed to uphold the following objectives and promote them in all levels of society:

1. To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.
2. To ensure efficient water management and the optimal use of the resources.
3. To ensure cooperation and joint action between the riparian countries, seeking win-win gains.
4. To target poverty eradication and promote economic integration.
5. To ensure that the program results in a move from planning to action. (Nile-COM, 1999)

Since the national-level water policies of the ENB represent the voices of the nations, it is argued here that the NBI Policy Objectives are appropriate assessment criteria to gauge the like-mindedness between the water policies of the ENB states and the NBI. In order to assess if these objectives have influenced the national water policies of the ENB, it is imperative to use them as the assessment criteria for this research. These objectives will be further broken down into measurable policy contents indicators. The challenge now is to create this list of indicators so that they are relevant to national-level water policy, applicable for transboundary river management, as well as appropriate for the NBI Policy Objectives.

2.3 Policy Contents Indicators from Integrated Water Resource Management

In order to judge the contents of each country's water policies against the NBI Policy Objectives, each Policy Objective is to be broken down into measurable indicators. The indicators required need to be flexible in the manner that they are applicable across the basin level so as not to pose an unfair advantage or disadvantage to one country over another. Therefore the indicators must be general yet specific enough for an accurate depiction of each of the NBI Policy Objectives. Proponents of the growing field of Integrated Water Resource Management (IWRM) condone a combination of water management techniques which "adopts integrated approaches...to satisfy the freshwater needs of all countries for their sustainable development" (Radif, 1999: 145). A necessity has occurred in each country of the ENB to do exactly that; fulfill their growing water demands without further degrading their fragile environments. The field of IWRM will thus be the source and inspiration for the measurable policy contents indicators.

Hence, a list of indicators is created here using the ideals of IWRM as a means of measuring the NBI Policy Objectives against the water policy contents of each country. The function of this set of indicators is to determine if the policy goals specified within the NBI Policy Objectives are repeated on national level water policies and are consistent with each other. The growing field of IWRM aims to incorporate tenets of sustainable development, healthy ecosystems and the economic and social welfares on a basin-wide context with an emphasis on public participation (Rahaman & Varis, 2005). Advocated by the UN and the World Bank, IWRM has been on the radar for decades but until recently has only served as theoretical background noise. In 2002 at the Johannesburg World Summit on Sustainable Development, IWRM was defined as the following by the Global Water Partnership in 2000:

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.

Emphasis was given that water should be managed in a basin-wide context as well as according to the principles of public participation and good governance (Rahaman & Varis, 2005). The above definition has been used in this paper due to the perception that although it is fairly recent, is now the standard definition cited in the majority of current literature (Radif, 1999; Biswas, 2004; Rahaman & Varis, 2005; Hassing et al., 2009). IWRM is based upon four key principles, known as the Dublin Principles formulated at the International Conference on Water and Development in 1992 in Dublin:

1. Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;
2. Water development and management should be based on a participatory approach involving users, planners and policy makers at all levels;
3. Women play a central part in the provision, management and safeguarding of water;
4. Water has an economic value in all its competing uses and should be recognized as an economic good (Hassing et al, 2009).

While IWRM has only recently become more clearly defined, the concepts behind it have been around for decades. Often a three pillar approach is taken but the contents vary according to author. The UN identifies the three pillars as an 1) institutional framework that creates the necessary laws, 2) an enabling environment for policies and legislation and 3) management instruments that are required by the former institutions to carry out their jobs (Hassing et al, 2009). Savenije's (2000) version of the three pillars is a bit different. The first two of institutions and enabling remain but the third is stated to be an operational pillar based on technical cooperation. In sum, while specifics may vary, IWRM is regarded as any multi-sectoral approach that incorporates environmental, economic and political considerations into a sustainable management plan for a transboundary water source. The ultimate goal of IWRM can be said to be achieved when the river basin is managed and developed as one whole system, rather than a sum of its various parts (Sadoff & Grey, 2005). Since the NBI Policy Objectives and the principles of IWRM share many of the same ideologies including sustainable development, it is indeed practical and appropriate to draw the measurable indicators from the field of IWRM.

2.4 Measurable Policy Contents Indicators

In order to measure these objectives, indicators are researched from the IWRM literature, including the fields of hydropolitics, international relations, transboundary water management and environmental security. In essence, these indicators will be utilized in a manner such that the greater number of indicators found within the national water policies, the more cooperative the nation is towards matching the objectives set forth in the NBI. Each of the five NBI Policy Objectives is now discussed in terms of these IWRM-based indicators.

2.4.1 Objective 1: To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples

This objective, by the far the wordiest and heftiest, contains the two main goals present within the NBI Mission Statement, that being, "To achieve sustainable socio-economic development, through the equitable utilization of, and benefit from, the common Nile basin water resources" (NBI, 2010). Hence the focus here is on the two concepts of sustainable development and equitable use. Both of these terms are also vague concepts that have various definitions allotted to them. For this research, sustainable development is specifically geared towards water use and therefore the definition of sustainable water use as proposed by Gleick (1998) will be used:

The use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle or the ecological systems that depend on it (574).

Therefore indicators that take into account the health of ecosystems and water quality are pertinent to include in this assessment. The national policies should take into account water that is necessary to maintain or even improve the health of ecosystems. Also in accordance with the above definition, the water needs of future generations ought to be addressed, in order for true sustainable development to occur.

The UN Convention on the Law of Non-Navigational Uses of International Watercourses states that in order to determine if a particular use of the river is equitable and reasonable, “requires taking into account all relevant factors and circumstances” (UN, 1997: Art. 6). Seven factors for concerned parties to keep in mind are then given including, natural characteristics of the area, the dependent populations from each State, existing and potential uses of the watercourse, and the availability of alternatives with a comparable value to a current or planned use (UN, 1997: Art. 6). These seven factors represent guidelines for policy makers to consider while determining what can be considered as ‘equitable’ or not. For this research, and in accordance with IWRM, equitable does not only mean fair, physical allocations of water from the river itself, but the evenhanded distribution of benefits and gains from an allocation (Howe, 1996). In order to make use of these gains, benefit sharing mechanisms are utilized to achieve fair and equitable benefits across riparians. “Benefit sharing can be defined as any action designed to change the allocation of costs and benefits association with cooperation” (Sadoff & Grey, 2005: 422). These benefits and costs can be physical, social, environmental, technological or economic. In many cases, benefit-sharing mechanisms involve redistribution and/or compensation from one riparian to another in order for certain benefits to be had. Sadoff & Grey (2005) also conclude that benefit-sharing mechanisms can be a catalyst for cooperation. This is due in part that with a mechanism set in place, it is possible for physical benefits to be separated from economic benefits for example, allowing for a greater perception of fairness between the riparians.

Since this policy objective states that all of a nation’s people deserve peace and security, an indicator here for public participation is necessary. The benefits of including affected stakeholder groups into the policy making process abound in literature (Uitto & Duda, 2002; Marty, 2001; Wolf, 1997; Durth, 1996; Jaspers, 2003; Giordano & Wolf, 2003; Ashton, 2002). To keep with the tenets of IWRM, special emphasis is also placed on the inclusion of women and young people in the decision making. Especially in rural areas, which the majority of the ENB is, women often have the most experience and most direct contact with water itself through domestic activities. Therefore it only makes sense to include the group that is most affected by water in their daily lives. Five indicators have thus been identified and can be seen below in Table 1.

2.4.2 Objective 2: To ensure efficient water management and the optimal use of the resources

Efficiency and optimal use are the two main goals of this policy objective and as in the first objective, are vague and often hard to define concepts. Efficiency in economic terms according to Howe (1996) is achieved when the allocation of water is made to its highest value use. Highest value use of course, may mean different things to different people or industries; hence the indicators used for this objective are ones that would make all sectors more efficient and obtain the optimal use of the water resources of the Nile. First of all, “the desired set of benefits provided by a resource does not have to be, and is unlikely to be, the same across different users or periods of time. Indeed, desired benefits of water use vary widely given political, religious, cultural, and technological differences” (Gleick, 1998: 573). A policy that is flexible with adaptive capacities for changing circumstances is of utmost

importance, especially with the growing uncertainties of climate change. One of the easiest ways of accomplishing this is for there to be seasonal stipulations as to how much water is allocated to whom (Kliot et al., 2001). Water needs are not the same during the dry season as they are during the wet season for example. By varying the allocations according to the season, water can be used more efficiently and where it will create the most benefits.

Varying the water quality standards depending on their use is another way to be economically efficient (Gleick, 1998). Cooling water for industrial use does not need to meet the same quality standards as drinking water for example, leading to a cost savings by not fully treating water that is used and re-used for industrial cooling. Technology thus plays an important role for gaining efficient and optimum use of water resources. To best capitalize on this, it is important for national policies to pledge to make use of best available technologies on both supply and demand sides (Gleick, 1998). By investing in solid infrastructure that both controls and delivers water resources, the productive value of water is sure to increase as losses decrease (Grey & Sadoff, 2007). These five indicators for the second objective are presented below in Table 1.

2.4.3 Objective 3: To ensure cooperation and joint action between the riparian countries, seeking win-win gains

According to Sadoff & Grey (2005), joint action occurs when “riparians act as partners in the design, investment, and implementation of international rivers development” (424). Essentially joint action means co-ownership of a certain development plan, structure, or data collecting research team. The level of these partnerships is heavily influenced by each riparian’s perception of the benefits that will come as a result from such cooperative efforts (Sadoff & Grey, 2005). These benefits can be varying, as discussed above under the first objective, with one very important advantage being the advancement of technological flows across national borders. Prakash & Hart (2000) argue that joint research ventures and technology exchange agreements are indeed facilitating these types of flows throughout transboundary river basins.

It is up to the national governments to promote these joint action ventures that contain benefits for all who participate. Joint fact finding is especially pertinent in this area as disagreements over hydrological data have been catalysts for conflict (Uitto & Duda, 2002; Wolf, 1997; Wolf, 1998; Gleick, 1993; Giordano & Wolf, 2003; Wolf, 1999). Once information is gathered jointly by the riparians, it is crucial that information sharing is encouraged and data is widely available and unrestricted (Gleick, 1998; Wolf, 1999; Cordery, 2001). Not only will national policy makers be helped by this information sharing, but with open access, all affected stakeholder groups will be better equipped to participate and make an impact. Indeed, “data-sharing can lead to breakthroughs in negotiations” (Wolf, 1999: 13). Information that is agreed upon by all riparians has a greater chance of being used to formulate and implement successful projects.

To ensure such cooperation, it is important that national policies set up avenues for conflict resolution mechanisms (Wolf, 1998; Gleick, 1993; Hamner & Wolf, 1998; Jaspers, 2003; Giordano & Wolf, 2003). These conflict resolution mechanisms are defined here in broad terms and can be interpreted as anything from committee tribunals to negotiations. The three indicators discussed here for measuring Objective 3 can also be found below in Table 1.

2.4.4 Objective 4: To target poverty eradication and promote economic integration

This objective, while containing two objectives in one, they are heavily intertwined within each other. It may even be suggested that one cannot occur without the other. In order for the

occurrence of poverty to decrease, the people need to make more money and have greater access to basic services such as food and clean water. Promoting economic integration within the ENB can facilitate better chances for employment. Economic integration refers to, “the processes leading to integration of final products, intermediate goods, and factor markets across countries coupled with the increased salience of cross-border value chains in international economic flows” (Prakash & Hart, 1999). In order to assess whether economic integration is happening, one must examine the status of customs tariffs within the region. By decreasing tariffs within the ENB, the countries are admitting that the ENB is a preferred trading area which will in turn spur further economic integration between them.

According to the WB, poverty is simply defined as, “pronounced deprivation in well-being” (World Bank, 2000). This of course, may be interpreted in a number of ways. For this research the indicators will be based on the UN Millennium Development Goals (MDGs). The MDG of Eradicate Extreme Poverty and Hunger contains three separate targets of which one solely addresses hunger and will not be addressed here. The first target is to halve the proportion of people whose income is less than \$1 (US) a day between 1990 and 2015. The second is to achieve full and productive employment and decent work for all, including women and young people (UNDP, 2007).

While it may seem odd to look for these indicators within a national water policy, it is an objective of the NBI and deserves equal attention. Initiatives should therefore be present within the national water policies that are the subject of this research that aim to reduce the proportion of people that live below US\$1 per day as well as projects that hope to increase employment. Both of these factors could be accomplished through joint development projects within the basin for example. Four indicators have been identified for this forth NBI policy objective as can be seen in Table 1.

2.4.5 Objective 5: To ensure that the program results in a move from planning to action

The final policy objective’s purpose seems to be to ensure that the above four objectives are not just talked about, but actually put into practice. In order to judge if the objectives are moving into action, an evaluation and re-evaluation system needs to be put in place to track progress (Uitto & Duda, 2002; Bernauer, 2002; Jaspers, 2003; Giordano & Wolf, 2003). A monitoring and evaluation plan when kept diligently will allow policy makers to see where and why progress is lacking and therefore be able to allocate resources to a particular sector that needs a boost in implementation. A monitoring and evaluation plan itself needs to be looked after by country-specific, inter-ministerial committees for coordination and implementation. It has been cited in the literature that most plans for transboundary river management will not get off the ground unless the national governments of each country take control of the initiative (Grey & Sadoff, 2007: 569; Uitto & Duda, 2002; Durth, 1996; Marty, 1997; Bernauer, 2002). These committees will specialize in achieving the NBI policy objectives within their nations. For these committees to be able to make things happen an adequate source of funding must be secured. Whether it is from the domestic budget or through FDI, a secure financial plan needs to be present. The above three indicators for this final objective are present below in Table 1.

2.5 Complete Assessment Framework and Scoring Method

The above discussion thus leads to the complete assessment framework below in Table 1 on which to evaluate the consistency between national goals and international commitments of each nation within the ENB. The 20 indicators shown above in Table 9, are again depicted in Appendix 1 with their respective IWRM-based citations.

Table 1: The NBI Assessment Framework

	NBI Policy Guidelines	Policy Contents Indicators
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	<p>Opportunities for affected stakeholder group involvement indicated</p> <p>Special consideration given to women and young persons for participation</p> <p>Water needs of future generations are kept in mind</p> <p>Water allocated toward ecosystem maintenance</p> <p>Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits</p>
2	To ensure efficient water management and the optimal use of the resources.	<p>Contains flexible policies with adaptive capacities for changing circumstances</p> <p>Seasonal allocations for water quantity</p> <p>Pledge to make use of best available technologies on both supply and demand sides</p> <p>Varying water quality standards for varying uses that can lead to economic savings</p> <p>Investment in infrastructure that control and deliver water resources</p>
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	<p>Promote joint fact-finding with representatives from multiple riparian nations</p> <p>Information sharing is encouraged and data is widely available and unrestricted</p> <p>Establish conflict resolution mechanisms</p>
4	To target poverty eradication and promote economic integration.	<p>Initiatives present to reduce proportion of population that lives below US\$1 per day</p> <p>Initiatives present to increase employment, especially among women and young people</p> <p>Recognized preferred trading area within the ENB</p> <p>Customs tariffs decrease or abolishment within ENB</p>
5	To ensure that the program results in a move from planning to action.	<p>Create country-specific, inter-ministerial committees for coordination and implementation</p> <p>Establish a monitoring and evaluation plan of progresses made</p> <p>Secure plan of funding in place whether it be domestic or FDI</p>

The following three chapters will examine the pre- and post-NBI era national water policies of the ENB, a chapter devoted to each country. In each of these chapters, the water policies will be scored in accordance with the above framework. Simply put, each Indicator will be given either a “+” or a “-” to indicate that it is or is not, part of the policy content in the respective policy. A “+” conveys that the indicator is present, and a “-” denotes that it is

absent from the policy document. The “+”s will then be added up to come up with a Total Score, a number in the range of 0 to 20. A Total Score of 20 indicates that the policy contains all 20 NBI Policy Objective indicators, while a Total Score of 0 signifies that the policy contains none of the NBI Policy Objective indicators. This Total Score will then be converted into a percentage (expressed in % out of 100). By converting each country’s Total Score into a percentage, a clearer picture is presented as to the extent that the policy takes into consideration the NBI Policy Objectives. These percentages will also allow for easier comparisons to be made between the three nations of the ENB.

2.6 Goal Attainment vs. NBI Influence

Even if the riparians score ‘well’ based on the above NBI Policy Objective Indicators, this does not necessarily mean that the increase in number of indicators present is due to the influence of the NBI. The riparians may simply achieve a higher percentage of indicators present, but not at fault of the NBI; this scenario will be known from here on out as Goal Attainment. It is acknowledged here that there could be alternative explanations for the riparians scores besides the NBI, such as a drive for more sustainable water management due to population growth which results in demand increases. The final phase of this research will be to distinguish the results of Goal Attainment from direct NBI Influence. The causal link of the NBI’s influence on the water policies will be established or dismissed through the discussion and possible rejection or acceptance of alternative explanations for the Goal Attainment. A final assessment will thus be made to determine the influence of the NBI on the national water policies of the ENB states.

2.7 Concluding Remarks

In this chapter, an assessment framework was created using the NBI Policy Objectives as well as IWRM driven measurable policy contents indicators, aimed at discovering the Goal Attainments of each of the three riparians in relation to the NBI. The following three chapters are dedicated to each of these three countries, Ethiopia, Sudan and Egypt. Within each chapter, a brief introduction is given followed by Pre- and Post-NBI policy descriptions and details. The Goal Attainment assessment is then made using the created framework and comparing the contents of both eras of national water policy. Results will then be presented numerically and graphically before an ENB comparative analysis is given, answering sub-questions S2 and S3 for each riparian.

3. ETHIOPIA: THE UPSTREAM RIPARIAN

3.1 Introduction

Beginning with the most upstream country of the ENB, Ethiopia is a nation with a rich and long history, and is recognized by many as the location where human beings began. Ethiopia can also boast that it is the African nation with only five years of imperial rule, Mussolini's Italy from 1936-1941, making it the most historically independent nation in Africa (Antonsich, 2001). The modern history of Ethiopia however, is marked with severe famines, bloody conflicts with its neighbors Eritrea and Somalia, and internal strife leading to uprisings. Millions have died due to famine and with the population exploding³, hunger will remain to be a crucial issue. Extreme and widespread poverty rack the nation with approximately half of the population living below the poverty line (Middlebrook, 2003). The absence of property rights for citizens has hampered economic and industrial growth; exacerbated by the fact that 85% of the nation's employment is in the agricultural sector (CIA, 2010). When drought occurs inevitably agricultural productivity declines. Coupled with the leasing arrangements that citizens must pay to the government for their land, the majority of the country has taken an economic nosedive, contributing to the poverty and wide-spread hunger.

Ethiopia is a federal democratic republic with judicial, legislative and executive branches. The government however, does not seem keen on "fixing" its internal problems that lead to poverty and hunger yet they find themselves within a long cycle of foreign aid reliance (Wiedemann, 2005). According to Wiedemann (2005), "Food aid is the country's second-largest industry, and it's growing at such a fast clip that it has outpaced Ethiopia's agricultural sector. Paradoxically, food aid is the reason why Ethiopians are sinking even more deeply into poverty. Between 1984 and 2002, annual per capita food production has dropped from 450 kilos (993 lbs.) to 140 kilos (309 lbs.)." Foreign aid is so prevalent that it is actually harming Ethiopian farmers; it is near impossible to sell their crops at competitive prices when "free" foodstuffs from aid organizations are just as easily accessible. Hence, internal food production is a very contentious issue. Coupled with massive environmental degradation due to poor, exhaustive farming practices that have subsisted almost entirely on rain fed methods; the need for proper irrigation is unavoidable. Ethiopia desires the increase use of its internal water sources for this among other purposes.

In this chapter focused solely on Ethiopia, the sub-questions S2 and S3 will be addressed and answered for the Pre- and Post-NBI water policy contents. First a brief description of Ethiopia's hydrological situation will be given, followed by descriptions of the Pre-NBI water policy and the Post-NBI water policy. The presence of the policy contents indicators in each of the policies will then be discussed along with the respective Goal Attainment scores for each policy.

3.2 Hydrological Situation

Ethiopia receives an average of 205 to 2010 mm of rain per year, depending on the topography of the region (UNEP, 2000). Ethiopia is also home to twelve distinct river basins, of which nine are transboundary and three are located with the ENB, the Abbay, Tekeze and Baro-Akobo Rivers, displayed below in Figure 5. The catchment area of these three rivers constitutes 358, 174 km², or roughly one-third of Ethiopia's total landmass (MoWR, 2010b).

³ Ethiopia has a population of over 85 million, ranking 14th in the world with a growth rate of 3.21%, ranking 7th highest in the World (CIA, 2010).

While these three rivers supply 86% of the total Nile flow, they also comprise 68% of Ethiopia's water resources, thus the Nile constitutes the majority of Ethiopian water, as in Egypt and Sudan (Arsano & Tamrat, 2005).

Hydropower has enormous potential in Ethiopia due to the natural high elevations and deep gorges that constitute the geography of the river basins. Many of the rivers begin at high elevations and run course down elevations, which creates ideal locations for dams and hydropower facilities. It is estimated that the combined hydropower production potential of the Abbay, Tekeze and Baro-Akobo Rivers totals 102, 710 GW hours per year. Incredulously, a mere 0.2 GW hours have been harnessed (Arsano & Tamrat, 2005). If these resources were further developed with dam projects, Ethiopia's electricity needs would be satisfied with leftover electricity available to export to Sudan, Egypt and the Arabian Peninsula (Kendie, 1999).

Irrigation is another area in which its potential is largely untapped. According to a 2001 report, the irrigable land of all three river basins amounts to 1,496,000 hectares (Mekonnen & Tarekegn, 2001). Sadly, only 30,000 (2%) of these hectares have been sufficiently developed (Arsano & Tamrat, 2005). The majority of agriculture is rain fed which leaves Ethiopia extremely vulnerable to drought and other natural happenings. Annual water use is highest in the agricultural sector with an estimated 5.2 km³ used; domestic withdrawal is estimated at 0.33 km³ and industrial at 0.02 km³ (FAO, 2008).

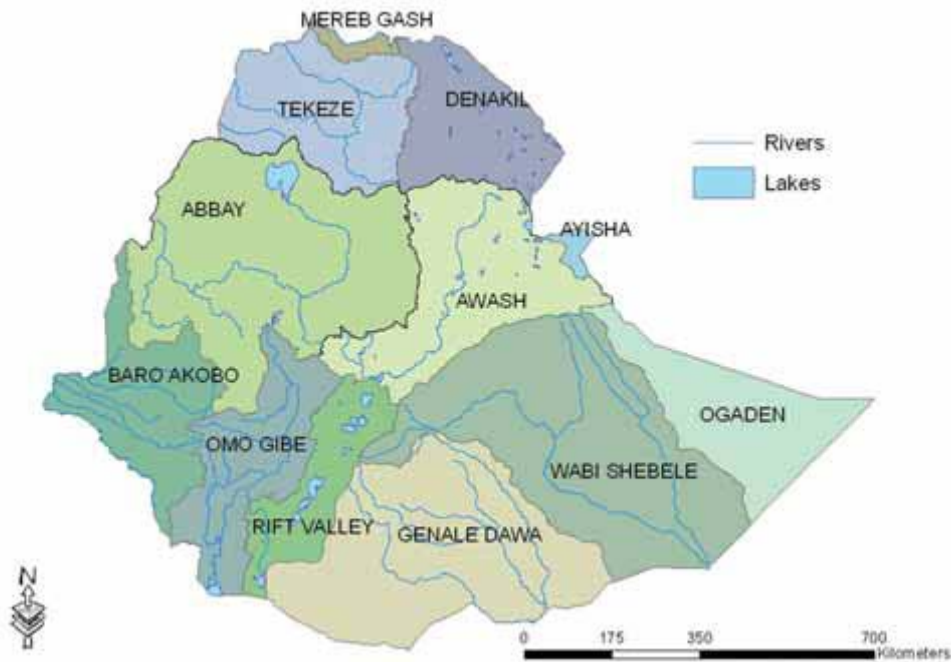


Figure 5: Map of Ethiopia depicting its river basins' areas
Source: Awulachew, S. B et al, 2007

The water resources of these three basins are vastly under developed in all aspects. It comes as no surprise then that the governmental body responsible for the management of water resources and the drafting of applicable laws, The Ministry of Water Resources (MoWR), was not formed until recently in 1995.

3.3 Pre-NBI Water Policies: Baro-Akobo, Tekeze and Abbay River Integrated Development Master Plans & Letter of Sector Policy

Prior to its current water policy, Ethiopia did not have a nation-wide water management policy that addressed the country as a whole. Separate river basin management plans were instead developed for the management of individual river basins as seen above in Figure 5. For this research, the management plans for the Baro-Akobo, Tekeze and Abbay (Blue Nile) Rivers are used for analysis. These three basins are the only ones out of Ethiopia's twelve that contribute to the main Nile River flowing through Sudan and Egypt and hence are suitable for the purposes of this study. The Baro-Akobo River Integrated Development Master Plan was completed in 1997 while the Tekeze and Abbay River plans were published the following year in 1998. The Plans were written using an IWRM approach and according to Aaron Tesfaye (2008), they each had two key objectives: 1) an inclusive and integrated water strategy for basin inhabitants in all sectors with a focus on sustainability and equity and 2) preparation of a water allocation and utilization plan for the basin. The overall agenda was to create a plan for the development of the basin for the next 30 to 50 years. Each Master Plan is composed of three distinct phases. Phase 1 is the Reconnaissance level, Phase 2 is for Survey, Data Collection and Analysis, and the final Phase 3 is the Master Plan Preparation (MoWR, 2010a).

To 'govern' the newly created Ministry of Water Resources, a Letter of Sector Policy (LSP) was also created as a roadmap for the management of Ethiopia's total water resources. The overall objective of the LSP is stated, "...to improve the well-being, health and productivity of the population by increasing coverage and ensuring the long-term viability of water supply and sanitation operations in line with the government's regionalization policies"(MoWR, 1996). Five goals are then listed as a means for achieving this objective:

- 1) Establishing the regulatory framework for the sector;
- 2) Formulation of integrated water supply and sanitation programs;
- 3) Ensuring sustainability and efficiency through rehabilitation and improvement of the water supply and sanitation infrastructure and operations;
- 4) Construction of new water supply and sanitation in urban and rural areas having due considerations to least cost options;
- 5) Capacity building, including institutional infrastructure & manpower development of the Regional Administrations and water supply and sanitation institutions; and involvement and participation of the communities, particularly women; this is assisted by the community participation and promotion offices established under zonal water sections.

The LSP continues with goals for various departments such as Technology, Design, and Capacity Building within the newly created water sector. A distinction is also made between the responsibilities of the Federal government, Regional governments and local communities. The primary document of the LSP, as well as secondary source information concerning the RIDMPs will be used for the Pre-NBI assessment.

3.4 Post-NBI Water Policy: Ethiopian Water Resources Management Policy

The current national level water policy for Ethiopia is the Ethiopian Water Resources Management Policy (WRMP) which has been deemed a historical document as it is the first comprehensive water resource management policy in Ethiopia's history. Based on an IWRM

approach, the goal of the WRMP is, “to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available Water Resources of Ethiopia for significant socioeconomic development on sustainable basis” (MoWR, 2001a: 5). The goal of socioeconomic development while maintaining sustainability are identical goals of the NBI as the NBI is also based on an IWRM approach. Five main objectives are presented in the WRMP and are as follows:

- 1) Development of the water resources of the country for economic and social benefits of the people, on equitable and sustainable basis.
- 2) Allocation and apportionment of water, based on comprehensive and integrated plans and optimum allocation principles that incorporate efficiency of use, equity of access, and sustainability of the resource.
- 3) Managing and combating drought as well as other associated slow on-set disasters through, inter alia, efficient allocation, redistribution, transfer, storage and efficient use of water resources.
- 4) Combating and regulating floods through sustainable mitigation, prevention, rehabilitation and other practical measures.
- 5) Conserving, protecting and enhancing water resources and the overall aquatic environment on a sustainable basis.

The WRMP is not based upon scenario development but instead addresses three separate components of the water sector: water supply and sanitation, irrigation, and hydropower. Each of these sections explains the current shortcomings that Ethiopia is facing, as well as the policy objectives and principles for the various topics within the component.

While the WRMP states the goals for the Ethiopian water sector, it does not go into detail as to how the MoWR plans on implementing them. This is where the Ethiopian Water Sector Strategy (WSS) comes into play. Also developed in 2001, the WSS is meant as a companion document to the WRMP with an aim at “...providing a road map in terms of ways and means to attain the water policy objectives—with due recognition to the principles around which these objectives have been developed”(MoWR, 2001b: 1). Objectives of the WSS provide for a more on the ground action oriented realization of the WRMP goals:

- 1) Improving the living standard and general socio-economic well being of the Ethiopian people.
- 2) Realizing food self-sufficiency and food security in the country.
- 3) Extending water supply and sanitation coverage to large segments of the society, thus achieving improved environmental health conditions.
- 4) Generating additional hydro-power.
- 5) Enhancing the contribution of water resources in attaining national development priorities.
- 6) Promoting the principles of integrated water resources management.

The WSS is divided into themes of General Water Resources, Water Supply and Sanitation, Hydropower, and Irrigation. Since the WSS contains a more thorough and detailed explanation of the policy goals and implementation plans, the scoring procedure will be conducted using WSS data.

3.5 Presence of Policy Contents Indicators in the Ethiopian National Water Policies

In this section, the results are given for both Pre- and Post-NBI national water policies as they have each been compared to the assessment framework. Below in Table 2, each of the five NBI Policy Objectives is listed along with their respective measurable policy contents indicators. One column is ascribed to each of the Pre-NBI water policy (RIDMPs and LSP) and the Post-NBI policy (WSS) with a corresponding '+' or '-' to indicate the presence of that indicator in the respective policy.

Table 2: Goal Attainment Scores for Ethiopian Pre- and Post-NBI Water Policy

	NBI Policy Guidelines	Policy Contents Indicators	Pre-NBI	Post-NBI
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	<p>Opportunities for affected stakeholder group involvement indicated</p> <p>Special consideration given to women and young persons for participation</p> <p>Water needs of future generations are kept in mind</p> <p>Water allocated toward ecosystem maintenance</p> <p>Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits</p>	<p>+</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	<p>+</p> <p>+</p> <p>-</p> <p>+</p> <p>+</p>
2	To ensure efficient water management and the optimal use of the resources.	<p>Contains flexible policies with adaptive capacities for changing circumstances</p> <p>Seasonal allocations for water quantity</p> <p>Pledge to make use of best available technologies on both supply and demand sides</p> <p>Varying water quality standards for varying uses that can lead to economic savings</p> <p>Investment in infrastructure that control and deliver water resources</p>	<p>-</p> <p>-</p> <p>+</p> <p>-</p> <p>+</p>	<p>+</p> <p>-</p> <p>+</p> <p>+</p> <p>+</p>
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	<p>Promote joint fact-finding with representatives from multiple riparian nations</p> <p>Information sharing is encouraged and data is widely available and unrestricted</p> <p>Establish conflict resolution mechanisms</p>	<p>-</p> <p>-</p> <p>-</p>	<p>-</p> <p>+</p> <p>-</p>
4	To target poverty eradication and promote economic integration.	<p>Initiatives present to reduce proportion of population that lives below US\$1 per day</p> <p>Initiatives present to increase employment, especially among women and young people</p> <p>Recognized preferred trading area within the ENB</p> <p>Customs tariffs decrease or abolishment within ENB</p>	<p>-</p> <p>+</p> <p>-</p> <p>-</p>	<p>+</p> <p>+</p> <p>-</p> <p>-</p>

Table 2 cont: Goal Attainment Scores for Ethiopian Pre- and Post-NBI Water Policy

	NBI Policy Guidelines	Policy Contents Indicators	Pre-NBI	Post-NBI
5	To ensure that the program results in a move from planning to action.	Create country-specific, inter-ministerial committees for coordination and implementation	-	+
		Establish a monitoring and evaluation plan of progresses made	+	+
		Secure plan of funding in place whether it be domestic or FDI	+	+
		Total Score/%	6/30	14/70

Based on the scores given above in Table 2, it is shown that there has been an increase in Goal Attainment in the Post-NBI policy as compared to the Pre-NBI policy. The Pre-NBI Policies, the Abbay, Tekeze and Baro-Akobo River Integrated Development Master Plans and the Letter of Sector Policy, contain 6 out of 20 indicators for a score of 30%. The Post-NBI Policy, the Ethiopian Water Sector Strategy contains 14 out of 20 indicators for a score of 70%. An extensive increase is thus shown in the Post-NBI Policy. Therefore it can be concluded that Ethiopia has incorporated the NBI Policy Objectives into the current water policy to a greater degree than in the past.

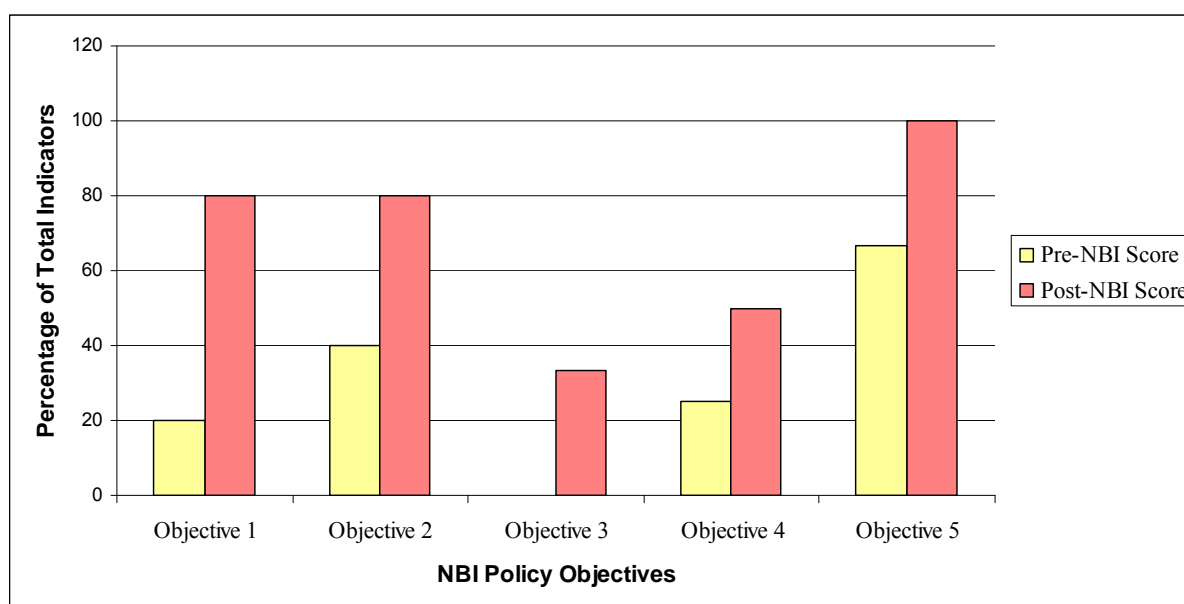


Figure 6: Pre- and Post-NBI Scores for Ethiopian water policy according to NBI Policy Objectives

Above in Figure 6, is a graphical representation of Ethiopia’s scores for both its Pre- and Post-NBI water policies, separated into the five NBI Policy Objectives. The graph clearly shows an increase in Goal Attainment in the Post-NBI Policy as compared to the Pre-NBI Policy in each of the five NBI Policy Objectives. The highest score belongs to the fifth objective, with the Post-NBI Policy obtaining 100% of the indicators. The lowest score belongs to the third objective with no indicators being present in the Pre-NBI Policy and only 33⅓ % present in the current, Post-NBI Policy. The Goal Attainment scores will now be further elaborated upon by discussing each indicator in further detail.

3.5.1 Objective 1: To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples

Opportunities for affected stakeholder group involvement indicated

An increase in Goal Attainment was not shown for this indicator as opportunities for stakeholder involvement were contained in both the Pre- and Post-NBI water policy documents. While the LSP and RIDMPs do not elaborate on stakeholder involvement to a large extent, there is evidence of involvement through the participation of community user groups and Water User Associations (WUAs)⁴. These WUAs are composed of farmers who are responsible for directly managing a certain area, usually most heavily involved in irrigation matters. The RIDMPs specify that the river basins will be broken down into regions, and each region will have a Board of Management. This Board of Management will report to the local Program Coordination Unit, which is also run and maintained by local citizens. Any person in the area is able to observe the Board and/or Program Unit and to take part in the implementation of its decisions (MoWR, 2010b). Through these organizations, stakeholder participation is promoted and made available to those that are interested.

Many opportunities are presented in the WSS for stakeholders to be involved in the multiple steps of policy making and implementation. A four-fold strategy is given that is meant to adhere to all aspects of the WSS; the strategy is as follows: 1) promote and enhance participatory approach in project identification, planning, implementation, operation and maintenance of water resources projects, 2) involve all stakeholders as partners in decision-making in water resources projects from inception to completion, 3) enhance and encourage the devolution of management responsibilities to the lowest appropriate level in water schemes, 4) establish mechanisms for stakeholder involvement such as, water committees, water boards, water users associations, professional and civic associations (MoWR, 2001b: 10). Special plans are also made to help promote the building and strengthening of community-government-private sector-external agencies partnerships to create discussion forums amongst affected stakeholders.

The WSS then goes one step further to ensure that stakeholders are involved by planning to “establish and legalize a process for the participation of all stakeholders (formal and informal) to ensure efficient management of WSS systems” (MoWR, 2001b: 21). Stakeholder participation will be further included by embedding the notion deeper into the actual legislation of the water sector. Special designation is given to involving local people into the project cycles of irrigation schemes. Public awareness campaigns focused on education are also in the plans of the WSS to more greatly enable affected stakeholders to participate. The informational capacity of WUAs is also a topic of discussion; by strengthening the capacity of such groups they are better able to make informed, independent decisions on how to best manage their local water supply with less reliance on the government for support.

⁴ A Water User Association or WUA is typically a collection of farmers and other local water users that form a coalition and are given some, if not all authority to locally manage the water resources of a certain section of land.

Special consideration given to women and young persons for participation

Goal Attainment witnessed an increase for this indicator; women are specifically mentioned in the Post-NBI policy but not the Pre-NBI policy. The LSP does differentiate women from other water users by acknowledging that “women and young girls are overly burdened within the sector, as they are the main suppliers and users of untreated water, and therefore remain the most susceptible to water-related illnesses” (MoWR, 1996: 1). However, this is as far as the distinction goes; special opportunities for women to become more involved in the policy process are absent.

Women are given special consideration under the Gender Mainstreaming section of the WSS. This section addresses the importance of including women in the policy making process as well as addresses the difficulties that women have faced thus far. In detail the WSS aims to further encompass women in water resources planning by a) pay special attention to the role of women while establishing community based structures for the management of localized WSS and small scale irrigation systems. Allocate a specific number of seats for women in these community based structures, depending upon the nature and size of the scheme, b) enhance the active involvement of women for the success of water projects and programs; and for the sustainable services of water schemes. Launch campaigns to encourage women to contribute in improved management of water schemes, and c) to take steps to relieve women for the huge burden of fetching and carrying water for the family by empowering them in decision-making in water projects (MoWR, 2001b: 10). The underlying causes as to why women’s roles are often restricted in water management are also concentrated on. The WSS plans to “reorient research and development efforts to better understand the constraints that restrict women in playing a lead role in the management of localized water systems, and devise appropriate measures to address those constraints” (MoWR, 2001b: 10).

Water needs of future generations are kept in mind

Evidence of future generations being recognized in any of the RIDMPs or the LSP could not be found. Although the WRMP and the WSS claim that they are for “all the people of Ethiopia”, the WSS makes no mention of the water that will be necessary for future generations’ use. Therefore a change in Goal Attainment between the two water policies is not observed.

Water allocated toward ecosystem maintenance

Non-anthropogenic concerns for the environment were not located in the LSP, or in any information available on the RIDMPs. Goal Attainment did increase in the Post-NBI policy for ecosystem concerns are presented in the WSS on a few occasions. While limited, they do address the preservation of the environment for non-anthropocentric purposes. Under the Water Resources Management section, a goal is professed to rehabilitate degraded watersheds as well as to regenerate the natural vegetation in the quantities and quality that should exist there. A second goal aims to establish soil and water conservation guidelines that relate to water resources development as well as ecosystem management (MoWR, 2001b: 6).

Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits

While the Pre-NBI water policies of Ethiopia make no plans for the design and implementation of benefit-sharing mechanisms between the riparians, an increase in this indicator is seen in the Post-NBI water policy providing for an increase in Goal Attainment. Both the LSP and the RIDMPs are Ethiopian-centric and while possible new water quantity allocation plans with downstream countries are discussed in the Abbay RIDMP, benefit-sharing mechanism are not part of the dialogue (Tesfaye, 2008). More recently, hydropower and irrigation are the two areas in which proposals for benefit-sharing mechanisms with neighboring countries are made. The vast hydropower potential of Ethiopia is addressed in the Hydropower strategy of the WSS where it is made a priority to “negotiate with the neighboring countries possibilities and arrangements for exporting electricity” (MoWR, 2001b: 14). This could be especially pertinent for Egypt and Sudan for they could allow Ethiopia a greater share of the Nile waters in exchange for cheaper electricity. In more general terms, under the section dedicated to transboundary waters, a goal is to identify common development projects that can be jointly shared and owned with other riparian countries “on an equitable basis, paying special attention to Ethiopia’s interest”(MoWR, 2001b: 8). While this statement is guarded for their interest, it is an acknowledged move towards cooperation on Ethiopia’s part.

3.5.2 Objective 2: To ensure efficient water management and the optimal use of the resources

Contains flexible policies with adaptive capacities for changing circumstances

Information on flexible policies for changing circumstances within the RIDMPs could not be located. Disaster management practices, or plans on what to do during low/high rainfall years are also not mentioned in the LSP. Since rainfall provides for the majority of the three river’s flows, droughts and floods are almost bound to occur periodically. Droughts in particular have wreaked havoc and cost numerous lives throughout Ethiopian history. However, changes have occurred in the Post-NBI water policy as the WSS lays out a plan to better avoid this in the future. Developing and implementing a comprehensive plan of action for flood and drought disasters is a significant portion of the WSS. Care is made to study the occurrence of floods and droughts, the areas they are prone to occur as well as their defining characteristics with the hope of more accurate predictions. One frank statement is made that sums up Ethiopia’s efforts to combat drought; “Plan ahead of time for combating droughts rather than going into crisis management of droughts and their effects”(MoWR, 2001b: 11). Through the further understanding of how and when these natural disasters occur, the WSS is setting the stage for more adaptive policies and legislation.

Seasonal allocations for water quantity

It has been discussed previously how the variability of rainfall in Ethiopia largely determines the amount of water available for use in a given period, yet this wet/dry distinction is not accounted for in the RIDMPs, the LSP or in the current WSS. No change is Goal Attainment for this indicator is thus observed.

Pledge to make use of best available technologies on both supply and demand sides

An increase or decrease in Goal Attainment is not seen here because this indicator is contained in both the Pre- and Post-NBI water policies. Technical data systems and innovative new pumping systems are noted in the LSP. To gain a greater insight into what exactly Ethiopia has to work with, the LSP mandates, “The establishment of integrated, reliable data systems, to include the functions of gathering, storage, retrieval, analysis, dissemination and use of data will, therefore, be a priority consideration”(MoWR, 1996: 3). Making use of the various steps involved in data management will allow for a more accurate knowledge base on which to create more effective water management policies. The LSP also states that research on hand pumps, solar power and wind mill driven pumps for an easier and more sustainable water attainment is being conducted and will continue with “added vigor” in the future (MoWR, 1996). It is hoped that these varying types of technology will help create a more stable water supply locally, regionally and nationally.

The WSS has set guidelines for appropriate technology use that will lead to maximum efficiency utilization of water resources. Under the document heading of Technology and Engineering, the WSS states that discernment should be made between “suitable” and “unsuitable” technologies after a nation-wide inventory of all the different types of current technology use is conducted. Once this inventory has been conducted, selection criteria will be developed that enable different water technologies to be chosen based on a set of technical and economic conditions (MoWR, 2001b: 12). This procedure is applicable to all components of the Ethiopian water sector, yet hydropower and irrigation technologies are once again singled out in the WSS. One goal of the hydropower policy is “enhance supply side efficiency” by reducing distribution losses and leakages through the investment in more effective technology (MoWR, 2001b: 15). Irrigation techniques are also subject to efficiency improvements through the transfer and adoption of modern irrigation technologies, such as drip instead of flood irrigation, to the appropriate institutions and WUAs. Additional capacity measures are to equip the institutions that manage the irrigation procedures with trainings on project design, construction and implementation so these new irrigation technologies are properly installed and maintained.

Varying water quality standards for varying uses that can lead to economic savings

Water quality standards, and methods to utilize water of varying quality, are absent from the LSP. Information on this indicator could also not be found for any of the RIDMPs. Treated wastewater, usually from industrial and residential use (sewage) can be used where the water quality is not necessary to be pristine to be effective in a particular use. However, a positive change is indicated in the Post-NBI policy, the WSS, as the section titled Water Supply and Sanitation contains plans to recycle this wastewater when it has been deemed safe and healthy for consumers and the environment (MoWR, 2001b: 22). Certain irrigation schemes and hydropower are listed as potential uses as this water is not directly consumed by people. In order to fully realize this goal, a separate component of the agenda aims to develop the standards by which this treated wastewater will be regulated. On-site, off-site, non-water dependent and water dependent systems are all recognized here.

Investment in infrastructure that control and deliver water resources

Irrigation development is a large component of the RIDMPs with 123 large and medium scale irrigation projects covering 526,000 hectares, as well as small scale irrigation projects amounting to 100,000 to 150,000 hectares in the Abbay River Basin alone (MoWR (b),

2010). Irrigation systems require networks of pumps, canals and delivery pipes that the RIDMPs acknowledge the necessity for. These types of investments are crucial for an efficient and effective irrigation system. Costs for these irrigation components are allotted in the RIDMPs investment plan.

The Goal Attainment indicator is also met in the Post-NBI water policy. One of the main elements in the Irrigation strategy of the WSS is to “Adopt improved and affordable systems and tools for water harvesting and pumping, for reducing seepage and losses in canals, for water control, storage and retention systems and measurement structures” (MoWR, 2001b: 23). In the more general section of Water Supply and Sanitation, a section of the strategy involves the promotion and the use to sustainable and cost effective infrastructure to increase supply, such as hand pumps in rural communities.

3.5.3 Objective 3: To ensure cooperation and joint action between the riparian countries, seeking win-win gains

Promote joint fact-finding with representatives from multiple riparian nations

While fact-finding in relation to Ethiopia’s river basins is present in the RIDMPs and LSP to a great extent, no information could be found to confirm joint fact-finding projects with either Sudan or Egypt. The WSS also promotes in great length the need to gather more information on the multiple transboundary rivers that begin in Ethiopia, but only for their own use, not for joint missions with Egypt or Sudan. Therefore, no change is observed in terms of Goal Attainment for this indicator.

Information sharing is encouraged and data is widely available and unrestricted

The RIDMPs and the LSP show no evidence of the encouragement of sharing information with the downstream riparians of Sudan and Egypt. Goal Attainment has increased however as the Post-NBI water policy, the WSS lays out a multi-step plan for data and information sharing. Information collection and dissemination is located in the General Water Resources Strategy section of the WSS, where an eight-fold program is elaborated upon for the streamlining of information management in all areas of the water sector: a) develop databases on all aspects of water resources, such as surface water, ground water, hydrology, meteorology, wells, boreholes, springs, water works, etc, b) review and assess available water resources data and information at all levels, and identify water resources information gaps, c) identify sources of water information, and initiate a program for data collection to rid these gaps, d) design database structure to facilitate entry, storage, retrieval, review, analysis and dissemination of collected water data, e) identify and define information requirements of users, f) develop guidelines on the dissemination of water resources information to enhance information networking, g) establish/strengthen Ethiopian Water Resources Information Centre within the Ministry of Water Resources with adequate facilities and professional staff, h) establish an interface between federal database and regional databases (MoWR, 2001b: 6). This plan applies to the hydropower, irrigation and water supply and sanitation measures contained within the WSS. Ambitious plans such as these have the hopes of creating an open water sector environment for national as well regional (ENB-wide) cooperation.

Establish conflict resolution mechanisms

Conflict resolution mechanisms to be used in case of disagreement with Egypt and Sudan are not developed within the RIDMPs, the LSP or the contemporary WSS. No change is therefore indicated in the Goal Attainment scores for Pre- and Post-NBI water policies.

3.5.4 Objective 4: To target poverty eradication and promote economic integration

Initiatives present to reduce proportion of population that lives below US\$1 per day

General poverty reduction measures could not be located within the LSP nor could information be found confirming their presence within the RIDMPs. This is no longer the situation; a positive increase in Goal Attainment was witnessed in the Post-NBI water policy. The WSS addresses the local food production problems that were touched upon in the introduction to Ethiopia. Increasing external food aid has created a sort of dependency where it is difficult for farmers to sell locally produced crops as the prices can not compete. The Irrigation Strategy of the WSS aims to discourage the import of agricultural products to “protect local products through strict enforcement of standards, quality control and high import taxation” (MoWR, 2001b: 26). Also by increasing the agricultural production efficiency through more efficient irrigation techniques, local production costs should decrease and create a more competitive market for locally produced crops.

Initiatives present to increase employment, especially among women and young people

Instruments for employment increases are contained in both the Pre- and Post-NBI water policies. According to Tesfaye (2008), part of the overall strategy of the RIDMPs is to enhance and increase irrigated farming to generate employment. The same is said for the hydropower sector; it is a goal of the RIDMPs for employment to increase as a secondary effect from hydropower generation. The LSP also addresses the need for more professionals in the entire water sector by stating that “there is a near depletion of professional manpower in the sector” (MoWR, 2010b). Causes for this depletion are given as low morale and motivation and no incentive scheme. Therefore a need is acknowledged for the creation of incentive policies to increase professional employment such as, bonuses, higher wages, more vacation time, and training opportunities.

Local employment is encouraged in both the General Water Resources Strategy as well as the Hydropower Strategy in the WSS. While no distinction is made between gender and age group, the WSS promotes the use of labor-intensive technologies during the construction and maintenance of water projects. Local manufacturing of the materials needed for such projects is also highlighted as well as utilizing local equipment and other resources for the development of water resource projects. Incentive programs are also slated for creation to encourage local consultant groups for these projects, rather than relying on external firms. Hydropower specific components of the policy are also present including the exact phrase of “create employment opportunities” to ensure self-reliance of local and national hydropower projects (MoWR, 2001b: 14).

Recognized preferred trading area within the ENB

Trade in general and on all accounts is not a measure of the RIDMPs, the LSP or the WSS and therefore recognition or measures to create a preferred trading area within the ENB are not present. No change in Goal Attainment can therefore be accounted for.

Customs tariffs decrease or abolishment within ENB

As stated above, trade imports and exports that would require tariffs are not a component of the RIDMPs, the LSP or WSS, resulting in no change in Goal Attainment. Tariff decreasing or abolishment programs designed to create more conducive trade within the region are also absent.

3.5.5 Objective 5: To ensure that the program results in a move from planning to action

Create country-specific, inter-ministerial committees for coordination and implementation

Plans for an inter-ministerial committee are not found in the LSP and the MoWR acknowledges that a weakness of the Abbay RIDMP is that it has “not indicated any mechanism for the inter-regional and inter-sectoral coordination for the implementation of the development plan of varied interventions and this indicates the negligence of the concept of integrated development” (MoWR, 2010b). However, an increase in Goal Attainment for this indicator is observed in the Post-NBI water policy. While an inter-ministerial committee is not in place as of yet, the WSS does provide plans to create one in the future. In the Enabling Environment component, within the General Water Resources Strategy, the first goal is to “establish effective institutions to secure sound institutional basis for sustainable development and management of water resources” (MoWR, 2001b: 7). These institutions include river basin management institutions that would be composed of various government officials from different ministries.

Establish a monitoring and evaluation plan of progresses made

Sources to confirm the presence of a monitoring and evaluation plan could not be found for the RIDMPs. The LSP however, does address the value of monitoring and evaluation in addition to a sound technical plan. An existing regulatory and monitoring framework is stated to be established within the MoWR on a federal level. The LSP also mandates that local and regional governments adopt a similar monitoring and evaluation system that must be reported to the MoWR on a regular basis.

Monitoring and evaluation plans appear multiple times throughout the WSS and to address various aspects of the water sector including groundwater management, hydropower and irrigation and legislation. A system for the regular monitoring of ground water levels, discharge and pumping levels is in the stages of development according to the WSS. Existing legislation is ordered to be reviewed and improved upon by streamlining it to include all aspects of the water sector, including the enforcement of regulations and bestowing of penalties to offenders. Thus a strengthening of enforcement capacities is called for by the WSS in order to secure that the legislation is indeed put into practice. Since the three rivers discussed here are all of a transboundary nature, the WSS has laid guidelines to assess and update the state of water affairs of these rivers every three years, while assessing and updating the demand for water of development projects in the rivers every five years. These assessments are meant to keep the status of the rivers’ physical attributes current for policy makers, as well the supply/demand ratios for those residents who depend on the rivers for their livelihoods.

Hydropower production is a highly regulated sector and the WSS aims to “ensure through regular monitoring that standards for the study, construction, operation and decommissioning phases are strictly met” (MoWR, 2001b: 15). The management of the funds

for the WSS is also subject to monitoring and evaluation. Community Water Committees in rural areas and Consumers' Councils in urban areas are the organizations that will conduct audits and inspections of water resource projects to greater ensure the accountability of project management (MoWR, 2001b: 19). Last but not least, irrigation systems are also scheduled to be more tightly monitored and continuously evaluated for improvements in design and efficiency. Since this indicator is present in both the Pre- and Post-NBI water policies, no change is observed in Goal Attainment status.

Secure plan of funding in place whether it be domestic or FDI

While the RIDMPs specify how much money the various projects will cost, the LSP gives insight as to where the funds will come from. Listing external loans and grants, government budget, NGOs and community contributions as funding sources, the LSP does not go into detail of how much money, or a percentage of total funds will come from each source. Better coordination efforts amongst the financiers however are called for in order to ensure the equitable distribution of funds to areas that need it most.

A funding plan is also found in the Post-NBI water policy resulting in no change regarding Goal Attainment. The projects included in the WSS are financed through multiple sources including external agencies, the government of Ethiopia and the private sector. Exact amounts or percentages are not included in the WSS yet for each of three stakeholders above the following is mandated, "to include in their budgets for water programs, provisions for water conservation and protection, operation and maintenance, rehabilitation and replacement costs, training and human resources development, adequate information and documentation as well as other mechanisms necessary to ensure the sustainability of the systems" (MoWR, 2001b: 9).

3.6 Conclusions

It has been shown here that the national water policies of Ethiopia have witnessed an increase in Goal Attainment in relation to the NBI Policy Objectives, and thus the NBI. The Pre-NBI water policy contained 6 of the policy contents indicators, while the Post-NBI water policy contained 14 of the policy contents indicators resulting in a 133% increase in Goal Attainment, or 8 policy contents indicators. An identical analysis will now be conducted on the national water policies of the Sudan.

4. SUDAN: THE “MASTER OF THE MIDDLE” RIPARIAN⁵

4.1 Introduction

Sudan is the largest country in area of Africa with an area of 2.5 million km² with a population of 42 million (July 2010 estimate) making it the least population dense country of the ENB (CIA, 2010). While Sudan is a Federal Republic, two autonomous regions reside within it, South Sudan and the Transitional Darfur Regional Authority in the western part of the country. These two autonomous regions have been ravaged by extreme civil war resulting in mass killings, rapes, torture and millions of displaced peoples. The war torn country is also estimated to contain over 1 million landmines in 16 of Sudan's 26 states, covering one-third of its territory (El Zain, 2007). Peace agreements however have recently been drawn between the Government of Sudan and the Sudan People's Liberation Army in 2004 and with the Transition Darfur Region Authority in 2006 (Saleh, 2008). All eyes will be on Sudan in 2011 to witness if Sudan will remain a united nation or if South Sudan will secede. As per the Comprehensive Peace Agreement with the Government of Sudan, South Sudan will decide through referendum whether or not to remain a part of one Sudan.

Despite the plethora of internal political happenings, Sudan is rife with natural resources. The large country has been deemed the Middle East's/Africa's bread basket due its fertile soils and prime agricultural terrain (Saleh, 2008). 80 million hectares, 60.5 of which lie in the Nile Basin have irrigation potential, yet currently only 1.6 million hectares have been irrigated (El-Tom Hamad & El-Battahani, 2005). Aside from its potential to be Africa's agricultural powerhouse, Sudan has also recently discovered its domestic oil wealth. Sudan officially became an oil exporting country in 1999 and now produces approximately 473,000 (2008 data) barrels a day and exports 300,000 (2007 data) barrels a day (CIA, 2010). These exports have given the Sudanese economy a large boost that has improved Sudan's creditworthiness status for foreign assistance. However, the exact hydrocarbon potential is relatively unexplored at this point leading to an uncertain future as an oil exporting country (Saleh, 2008).

In this chapter focused solely on Sudan, the sub-questions S2 and S3 will be addressed and answered for the Pre- and Post-NBI water policy contents. First a brief description of Sudan's hydrological situation will be given, followed by descriptions of each the Pre-NBI water policy and the Post-NBI water policy. The presence of the policy contents indicators in each of the policies will then be discussed along with the respective Goal Attainment scores for each policy.

4.2 Hydrological Situation

The Nile basin accounts for 70% of the area in Sudan. Over 40 rivers and streams intersect and flow from the jungles and swamplands in the south up through the Libyan and Nubian deserts in the north with the majority ending up in the Nile system (Saleh, 2008; El Zain, 2007). The three main tributaries of the River Nile join together in Khartoum, Sudan, the White Nile, Blue Nile and the Atbara River. Sudan was allotted 18.5 BCM per the 1959 agreement as measured at Aswan, yet this amounts to 20.5 BCM when measured in central Sudan. Other internal water resources include non-nilotic streams replenished by erratic rainfall and groundwater reserves. One-third of these non-nilotic streams flow in from neighboring countries, with the rivers Gash and Baraka from Eritrea and the Azoom River

⁵ Phrase taken from Waterbury, 2002

from Chad. Depending on the rainfall of a given year, the amount of water from these streams is anywhere from 3 to 7 BCM with an average of 5.4 BCM. Renewable groundwater reserves have been estimated at approximately 4 BCM giving Sudan a total water budget of roughly 30 BCM (El Tom Hamad, 1998). While the Sudan is not as dependent upon the Nile for water as Egypt, it does supply the majority of Sudan's water; 68% according to Sudan's allotment in the 1959 Agreement with Egypt. Dividing these 30 BCM of water by the projected 42 million strong population gives Sudan a water budget of 714 m³ per person per year, well under the water stress limit of 1,000 m³. According to El-Tom Hamad & El-Battahani (2005), it is this degree of water scarcity that has limited irrigation development, and thus agricultural output in Sudan. However, the recently constructed and massive Merowe Dam in Northern Sudan aims to assuage the low percentage of irrigated land. The dam is expected to be able to irrigate up to 20,000 ha of land, produce an annual electricity yield of 1250 MW and hold on to 12.5 BCM in its reservoir (Salah, 2008).

Benefits from the Merowe Dam will be tremendous for as in Ethiopia, rainfall in Sudan is erratic and limited to a rainy season less than four months long, with the rest of the year being virtually dry, creating a long dry season with high evaporation rates (El-Tom Hamad & El-Battahani, 2005). Many dry years were experienced in the 1980's and six serious floods occurred in 1994, 1996, 1998, 1999, 2000 and 2001 which exacerbates the variability in rainfall patterns (El-Tom Hamad & El-Battahani, 2005). Average rainfall levels range between 0 mm per year in the northern desert to 1610 mm per year in the southern swamplands (UNEP, 2000).

The southern swamplands are of particular interest for they contain the Sudd region swampland, which is the largest swamp in the world covering 6500 square kilometers. The White Nile loses approximately 45% of its flow here due to evaporation and transpiration (Wolman & Giegengack, 2007). Construction on the Jonglei canal began in 1978 as a means to counteract this evaporation but was suspended in 1983 when it was $\frac{3}{4}$ complete due to conflict; the Sudan People's Liberation Army attacked the machinery responsible for the construction in 1984. Further progress on the canal has ceased since then. It is estimated that approximately 4 BCM would be added to the Nile flow once the Jonglei Canal is complete. The situation of the Jonglei canal will be of even more interest to Egypt and Sudan if Southern Sudan does secede in 2011. A brand new riparian to the ENB will be in control over a new addition to the already contested water allocations of the Nile River.

4.3 Pre-NBI Water Policy: National Comprehensive Strategy of 1992

The current water policy that is discussed in the following section, is the first comprehensive national level water policy for Sudan. Prior to this, Sudan's water resources were managed by fragmented policies that addressed the various areas of the water sector. Therefore, prior to the current policy, there was no clear cut policy that was water specific (Haileslassie et al., 2008). However, the National Comprehensive Strategy (NCS) is a national development plan with the focus of sustainable development across the country that addresses all areas, including water management. The NCS will therefore be used as the Pre-NBI water policy for this research.

The NCS is a product of the Government of Sudan and was constructed when the irrigation and water resources sector was considered as a sub-sector of the agricultural sector, for the majority of water resources in Sudan are used for agricultural purposes (MoIWR, 2000). The objectives of the irrigation and water resources sub-sector are:

- 1) Full and efficient utilization and development of surface and groundwater resources;

- 2) Building of dams on rivers other than the Nile and on seasonal valleys;
- 3) Addressing the problem of silt in reservoirs through the enlargement of existing reservoirs by increasing their height and the construction of new dams;
- 4) Eliminating thirst and develop safe water supply networks all over the country; and to procure water for human and animal life completely by the end of the duration of the NCS;
- 5) Developing the water sector manufacturing industry to supply water pumps, drilling equipment, pipes, reservoirs and spare parts
- 6) Developing economic criteria for the utilization of water in such a manner as to maintain a balance between the costs on the one hand and the economic and social return on the other.

The main subjects that the NCS emphasizes are food security, sustained agricultural development, efficient natural resource utilization and high agricultural yield enhancement, all of which can only be achieved through smart and effective water management (Hailelassie et al., 2008).

4.4 Post-NBI Water Policy: Sudan National Water Policy

Sudan's current national water policy is the Sudan National Water Policy (SNWP) that was finalized and agreed upon in 2002. For this research, the draft document from 2000 is used as the finalized version could not be located for analysis. The SNWP is the first comprehensive national level water policy that deals with multiple aspects of water supply and management. Five key objectives are listed as overall objectives of the SNWP:

- 1) To bring together and clarify existing policy;
- 2) To review and adapt water policy to meet changing circumstances within the country;
- 3) To ensure that the water resources of Sudan are properly managed, protected and efficiently utilized for the benefit of all;
- 4) To provide the basis for the ongoing development of water related regulations and legislation;
- 5) To strengthen and rationalize water related institutions in both the public and private sectors in Sudan.

The SNWP prides itself on the extensive use of stakeholders from the government, academia and the private sector. Meetings were also held in various parts of the nation with representatives of state governments, farmers, communities, NGO's, external support agencies and the private sector for further insight and input. The importance of this 'close-knit' community feeling is well stated in the introduction of the document,

“One of the most important objectives of this policy document is to ensure that the national water policy of Sudan is clear, simple and accessible to ordinary people in the country. More often than not government policy is unclear because it can only be found embedded in complicated legislation and lengthy documents which makes the implementation of policy very difficult. In line with international trends, the Sudanese National Water Policy has been purposely written in ordinary language and is addressed to all the peoples of Sudan” (MoIWR, 2000: 5).

This aspect is of special mention as it is a characteristic that sets the SNWP apart from the policies of Egypt and Ethiopia, especially Egypt with its largely top-down approach that will be discussed in the next chapter. The SNWP also labels itself as a baseline document, meaning that it is part of a process of continuous policy development and refinement. The policy begins with background information, continues with policy issues for the “proper management, utilization and development of water resources”, and concludes with “recommendations for the development of a strategic plan for implementation” of the policy (MoIWR, 2000: 5).

4.5 Presence of Policy Contents Indicators in the Sudanese National Water Policies

In this section, the results are given for both the Pre-NBI and Post-NBI national water policies of Sudan as they have each been compared to the framework that was created in the latter half of Section 3. Below in Table 3, each of the five NBI Policy Objectives is listed along with their respective measurable policy contents indicators. One column is ascribed to each of the Pre-NBI water policy (NCS) and the Post-NBI policy (SNWP) with a corresponding ‘+’ or ‘-’ to indicate the presence of that indicator in the respective policy.

Table 3: Goal Attainment Scores for Sudanese Pre- and Post-NBI Water Policy

	NBI Policy Objectives	Policy Contents Indicators	Pre-NBI	Post-NBI
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	Opportunities for affected stakeholder group involvement indicated	+	+
		Special consideration given to women and young persons for participation	+	+
		Water needs of future generations are kept in mind	-	+
		Water allocated toward ecosystem maintenance	-	+
		Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits	-	-
2	To ensure efficient water management and the optimal use of the resources.	Contains flexible policies with adaptive capacities for changing circumstances	+	+
		Seasonal allocations for water quantity	-	-
		Pledge to make use of best available technologies on both supply and demand sides	+	-
		Varying water quality standards for varying uses that can lead to economic savings	-	+
		Investment in infrastructure that control and deliver water resources	-	+
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	Promote joint fact-finding with representatives from multiple riparian nations	-	-
		Information sharing is encouraged and data is widely available and unrestricted	-	-
		Establish conflict resolution mechanisms	-	-

Table 3 cont: Goal Attainment Scores for Sudanese Pre- and Post-NBI Water Policy

	NBI Policy Objectives	Policy Contents Indicators	Pre-NBI	Post-NBI
4	To target poverty eradication and promote economic integration.	Initiatives present to reduce proportion of population that lives below US\$1 per day Initiatives present to increase employment, especially among women and young people Recognized preferred trading area within the ENB Customs tariffs decrease or abolishment within ENB	- - - -	- - - -
5	To ensure that the program results in a move from planning to action.	Create country-specific, inter-ministerial committees for coordination and implementation Establish a monitoring and evaluation plan of progresses made Secure plan of funding in place whether it be domestic or FDI	+ + +	+ + +
Total Score			7/35	10/50

Table 3 above concludes that there is a slight increase in the scores of the two policies. The Pre-NBI policy, the National Comprehensive Strategy 1992-2002 contains 7 out of the 20 indicators for a score of 35%. The Post-NBI policy, the Sudan National Water Policy draft of 2000 contains 10 out of 20 indicators for a score of 50%. Therefore it can be concluded that Sudan has indeed incorporated the NBI Policy Objectives into the current water policy more fruitfully than in the past.

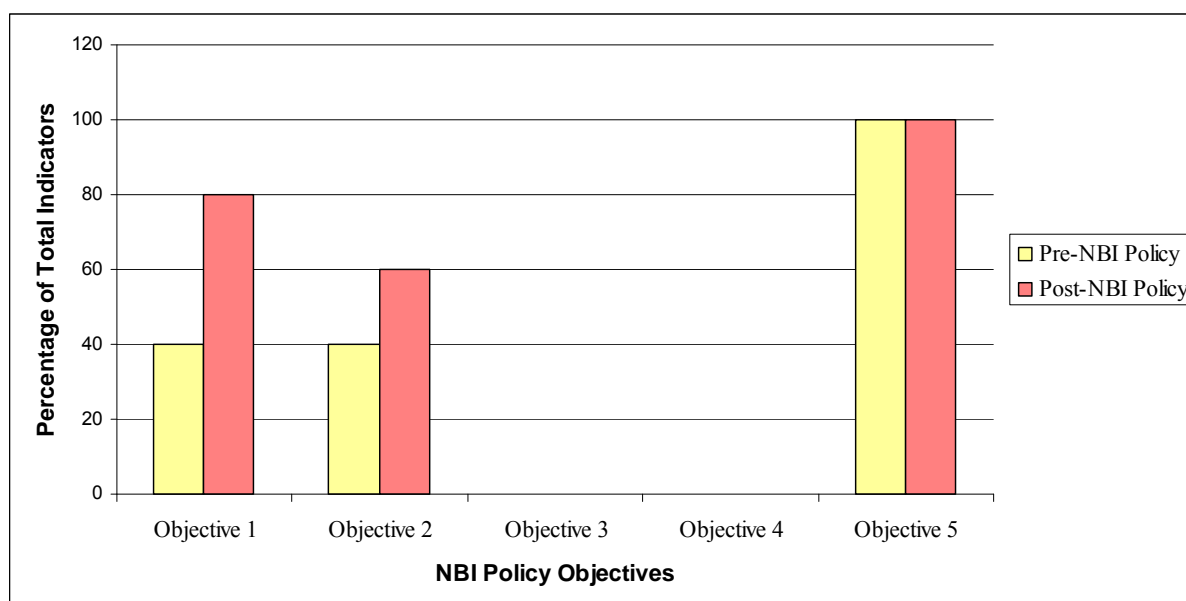


Figure 7: Pre- and Post-NBI Scores for Sudanese water policy according to NBI Policy Objectives

Above in Figure 7, is a graphical representation of Sudan's scores for both its Pre- and Post-NBI water policies, separated into the five NBI Policy Objectives. The graph shows an increase in the number of indicators in the Post-NBI Policy as compared to the Pre-NBI Policy in two out of the five objectives, numbers one and two. The highest score belongs to the fifth objective, showing no change as both the Pre-NBI and the Post-NBI Policy obtained 100% of the indicators. The lowest scores, or zero scores, belong to the third and fourth objective with no indicators being present in the Post-NBI or Pre-NBI Policy, exhibiting no change. The scores will now be further elaborated upon by discussing each indicator in further detail.

4.5.1 Objective 1: To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples

Opportunities for affected stakeholder group involvement indicated

Sudan displays many extensive opportunities for stakeholder involvement in both the Pre- and Post-NBI water policies, therefore no increase is shown in Goal Attainment. The NCS greatly emphasizes participation from stakeholders in multiple fields including irrigation, training and data recognition, decision making, participation of NGOs and public awareness campaigns (Mohamed, 1998). Stakeholders are defined here as national governments, NGOs, general public, women, farmers, households, user associations, farmers' groups, local communities, private sector, the world community and future generations. "We [Government of Sudan] give great importance to the stakeholders participations and partnership in water resources planning and management for all water uses encompassing drinking, sanitation, irrigation, hydropower, industries, navigation as well as environmental protection" (Mohamed, 1998: 3). The reasoning behind the NCS's comprehensive stakeholder participation is to avoid conflicting interests and ensure sustainability.

In order for the many types of stakeholders to effectively participate, the NCS highlights the establishment of the Water Management and Irrigation Institute at the University of Gezira that provides training and data for the understanding of water management topics for all levels of water users. WUAs possess great involvement in the NCS and are given many rights and responsibilities, especially in irrigation. The farmers themselves deal directly with the planning, maintenance and management operation of the irrigation schemes and are later financially reimbursed by the government for costs incurred. The role and importance of NGOs are included in the NCS as well and are highlighted as having a facilitation role for citizens to become more intimately involved with the decision making process. Public awareness strategies are also given importance for creating and maintaining a participatory approach and enhancing a sustainable use of water resources. Information disseminated in these strategies will help to inform the public of information pertinent to water policy decision making and will be provided through mediums such as education in schools, radio, television, the press, and information packets.

Similar to the NCS, the SNWP is also very heady on the topic of stakeholder and public participation. In addition to the clear wording of the policy itself so that it is more widely accessible, the SNWP contains twelve Overarching Policy Principles and Objectives. Three of these Overarching Principles (numbers 3, 6 and 7) directly address the importance of stakeholder participation:

- 3) Development of water resources must be demand driven and management should be undertaken at the lowest possible level.

- 6) Water resources management affects everybody and should be undertaken with the participation of relevant stakeholders.
- 7) People are stakeholders for water use and the national government is the custodian of all water in Sudan for the equitable benefit of all and in the public interest (MoIWR, 2000).

The Principles are to adhere to every aspect of the SNWP and its implementation. Special mention is made to the development in surface waters in which the SNWP declares that “public awareness and community participation should be an integral part of the formulation and implementation of water resources policy & development programmes. The water policy should stem from grass roots, be clear [and] transparent” (MoIWR, 2000: 16).

The Water Management and Irrigation Institute at the University of Gezira whose establishment was discussed in the NCS, is now under full scale operation in the SNWP with the continued mission of training all categories of water users. Lastly, the closing sentence of the SNWP reiterates the commitment that Sudan has to incorporating all affected stakeholders into the process by concluding: “Many people have contributed to the writing of this policy document and all people in Sudan are invited to comment on it and contribute to its ongoing development and refinement”(MoIWR, 2000: 34).

Special consideration given to women and young persons for participation

Sudan also displays the same affinity for participation opportunities for women in both the Pre- and Post-NBI water policies. It has just been shown that the NCS identifies women as a distinguished stakeholder in the previous indicator elaboration, yet there is also a separate section that highlights the essential role that women knowingly and unknowingly have in the water management sector. “Women take the necessary steps to ensure that water remains clean, safe and healthy” for their families and from this they have gained important insights that are essential for effective water management policy (Mohamed, 1998: 5). Women are also very active in agricultural realms of watering, draining, seeding, harvesting and picking crops and therefore should be elected into the WUAs. These women will then have a more prominent role in the policy making process.

Women are not singled out for public participation in the SNWP to the extent that they are in the NCS. Capacity building is a separate section of the SNWP and in this section they address the various needs and capacity building interventions that need to take place for the full utilization of the SNWP objectives. Different trainings are suggested with foci on what are deemed as ‘priority areas’ with one being “the role and empowerment of women” (MoIWR, 2000: 33). This training concerning the role of women will have a definitive set of measurable objectives and is targeted at the full range of skilled professionals.

Water needs of future generations are kept in mind

An increase in Goal Attainment is seen for this indicator for while the NCS does identify future generations as a stakeholder this is as far as the distinction goes, it is not future discussed nor detailed and therefore does not garner enough placement in the policy to be granted a positive score in this analysis. On the other hand, the SNWP specifically point out the significance of future generations on two separate occasions. The first is in the Overarching Principles in which number 9 states, “The environment needs to be protected in order to ensure sustainable utilization for present and future generations” (MoIWR, 2000: 13). Again, this Principle of the SNWP is meant to adhere to all components of the policy. The second instance occurs in the groundwater section of the SNWP where the following is

listed as a policy objective, “Present and future water users have a right of access to clean and unpolluted groundwater resources and an un-degraded environment”. The importance of keeping groundwater pollution-free is also discussed in line with future generations with this blunt statement, “Pollution is generally an irreversible process. Therefore it is of the utmost importance to maintain unpolluted aquifers not only for the present users but also for future generations” (MoIWR, 2000: 18).

Water allocated toward ecosystem maintenance

In regards to water for non-anthropocentric ecosystem maintenance, no mention is given in the NCS. Quite the opposite is evident in the SNWP where ecosystem maintenance is garnered attention twice with respect to biodiversity and long term sustainability of the ecosystem. As stated in the section of the SNWP titled, Biodiversity and wildlife, “Water plays an important role in the ecological balance. Water resources management policy should therefore aim at providing optimum water requirement in each ecological zone for maintaining biodiversity at its optimum levels, thereby ensuring the security of Sudan’s natural heritage”(MoIWR, 2000: 27). Delving further into the subject, a policy objective for the Biodiversity and wildlife sections is that the “development and use of water resources should not compromise the long term sustainability of aquatic environments” (MoIWR, 2000: 27). Goal Attainment for this indicator is therefore achieved in the Post-NBI water policy, but not the Pre-NBI water policy resulting in an increase in score.

Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits

Benefit-sharing mechanisms with Egypt or Ethiopia are not given attention in the NCS. The same situation occurs in the SNWP as well as it too does not mention the development, use, or implementation of any benefit-sharing mechanisms, hence no change occurs in Goal Attainment between the two policies.

4.5.2 Objective 2: To ensure efficient water management and the optimal use of the resources

Contains flexible policies with adaptive capacities for changing circumstances

Flexible policies can be found in both the Pre-NBI and Post-NBI water policies resulting in no change for Goal Attainment. The NCS pledges to make use of various data analysis and modeling tools in order to keep its policies up to date and adaptable. Entitled ‘Integrated Planning’, the NCS assures that Sudan will take the “...appropriate assessment and analysis of water resources availability and demand through continuous monitoring of data information and updating of the national water development and management plans” (Mohamed, 1998: 6). Unpredictable effects from climate change such as drought and desertification are also accounted for in the NCS. Studies on climate change are being promoted and plans to mitigate the impact of drought are in place.

Aside from the invitation to “all the people in Sudan” in the concluding remarks for suggestions for the continuous improvement of the document, the SNWP addresses flexible policies in the realm of flood and drought disaster management. The SNWP highlights that a series of dry years were experienced from 1978 to 1987, followed by four flood years in 1988, 1994, 1996 and 1998. When dry years are followed by a series of wet years, there are heavy consequences on the flows (flood flows recede at a much higher rate) and

sedimentation content (it is much higher) of the Nile and its tributaries (MoIWR, 2000). The Sudan stresses that these relationships need to be taken into consideration so that the SNWP is relevant and applicable no matter the hydrological situation. If these droughts and floods become more severe, the SNWP highlights the planned development of a national Disaster Management Plan that is to be embedded in the final version of the SNWP to deal with the effective response to such disasters (MoIWR, 2000).

Seasonal allocations for water quantity

While it is known that the total amount of water resources depends on rainfall patterns, the NCS does not acknowledge this distinction. Certain times of year harbor more rainfall in Sudan and Ethiopia and therefore a greater Nile flow, yet seasonal allocations are also not made for these dry and wet seasons in the SNWP. Goal Attainment for this indicator thus remains static.

Pledge to make use of best available technologies on both supply and demand sides

This indicator creates an interesting case as Goal Attainment actually decreases from the Pre-NBI water policy to the Post-NBI water policy. The NCS emphasizes the use of modeling techniques in order to supply the best information to policy makers. A “computerized, mathematical water resources management model” is slated to be developed and used to model and study Nile tributaries, reservoirs, irrigation and other water abstractions (Mohamed, 1998: 7). Results and information obtained from this model will be used to determine operational procedures for the various components of the water sector as well as flesh out multiple planning scenarios. Technological advancements for the betterment of water management engaging in best available technology use or implementation strategies are not revealed within the SNWP.

Varying water quality standards for varying uses that can lead to economic savings

Economic savings by differing water quality standards, i.e., cooling water for industry does not necessarily need to be drinkable, is not a component of the NCS. However, the situation changes in the Post-NBI water policy as wastewater reuse for industry cooling is briefly discussed in the SNWP as a means to utilize water more economically and efficiently. Treated drainage water and wastewater from industry are identified as a “means of increasing water for agriculture and general use” yet attention must be paid to control salinity and the spread of water borne diseases. The SNWP further acknowledges that more research needs to be done on primary and secondary wastewater treatment options to further maximize wastewater usage throughout Sudan resulting in an increase in Goal Attainment.

Investment in infrastructure that control and deliver water resources

Goal Attainment increase can also be seen in this indicator. Retrofitting canals, pipes, and irrigation infrastructure among other water resource control and delivery mechanisms are not an element of the NCS. However, it is stated in the SNWP that “the government should oversee the upkeep of irrigation infrastructure to avoid frequent expensive rehabilitation costs” (MoIWR, 2000: 15). Special consideration is given to aged pumping units, the screens and casings surrounding low yield bore-holes, and sewerage systems and septic tanks. The SNWP points out that all of these existing systems are to be “rehabilitated to acceptable operational levels” in the near future (MoIWR, 2000: 21).

4.5.3 Objective 3: To ensure cooperation and joint action between the riparian countries, seeking win-win gains

Promote joint fact-finding with representatives from multiple riparian nations

The promotion of multi-riparian joint fact-finding, in this case with Egypt or Ethiopia, in order to develop multilateral uses of the Nile, is not an integral measure in the NCS. The same circumstances are found within the SNWP as collaborate fact-finding and data reconnaissance measures are not included in the document. The scores for Goal Attainment thus remain at zero.

Information sharing is encouraged and data is widely available and unrestricted

While the NCS does talk about the importance of data and information dissemination to all stakeholders within Sudan, this same component is not promoted at the regional level for information sharing with Egypt and Ethiopia. This point of view is also encompassed in current times with no mention of data and information dissemination of Nile water resources to the other riparians is included in the SNWP. The scores for Goal Attainment once again remain unchanged at zero.

Establish conflict resolution mechanisms

As with the other two indicators within this NBI Policy Objective aiming for collaboration with the remaining members of the ENB, a conflict resolution mechanism to be used when disagreements on how the Nile ought to be managed is absent from the NCS. The current policy does not reverse the previous absence; conflict resolution mechanisms to be used in case of disagreement during collaborative efforts with the ENB are not included in the SNWP. Zero increase in Goal Attainment is thus observed for the entire NBI Policy Objective as this indicator's score also remains unchanged at zero.

4.5.4 Objective 4: To target poverty eradication and promote economic integration

Initiatives present to reduce proportion of population that lives below US\$1 per day

The agricultural sector portion of the NCS which contains the water sub-sector, does not address poverty in the form of poverty reduction programs or measures. Goal Attainment does not increase or decrease for this indicator as poverty reduction measures are also not part of the Post-NBI water policies' content. Reducing poverty is not a priority of the SNWP as poverty reduction measures in the form of decreasing the amount of the population that lives below US\$1 per day are not part of the policy

Initiatives present to increase employment, especially among women and young people

A stagnant Goal Attainment situation occurs in this indicator as employment increasing measures are not part of the NCS water sub-sector programs or policies. These initiatives are also not an integral part of the SNWP, as employment increasing measures are not covered, nor are the distinction for women and young persons established.

Recognized preferred trading area within the ENB

The issue of trade is not a piece of the water sub-sector portion of the NCS and therefore economic policies dealing with the recognition of a preferred trading area within the ENB area, or preferred trading partners Egypt and Ethiopia is not discussed. The SNWP does not improve in this area as trade is also not detailed in the document nor is the identification of the ENB as a preferred trading area highlighted. Therefore there is no Goal Attainment achieved for this indicator for the Pre- or Post-NBI water policy.

Customs tariffs decrease or abolishment within ENB

As with the previous indicator, zero change occurs and Goal Attainment remains at zero. Since trade is not covered in the water sub-sector portion of the NCS, the presence of customs tariffs nor their decrease or abolishment within the ENB is not addressed in the NCS. The same situation occurs in the current SNWP, where tariffs in general, let alone their reduction are present in the policy.

4.5.5 Objective 5: To ensure that the program results in a move from planning to action

Create country-specific, inter-ministerial committees for coordination and implementation

Previously in the Pre-NBI water policy, the NCS elaborated on the creation of the National Water Resources Council which is composed of "...all the institutions involved in water planning and use and whose task is to formulate the general national water resources policy pertinent to the water resources inventory, assessment, rational management and use, environmental protection, and the integrated and balanced development of water resources" (Mohamed, 1998: 6). It is the job of the Council to draw up plans and programs with defined priorities for Sudanese water management and to also submit recommendations for shared water use with the other riparians. The National Water Resources Council has since been established in 1995 and is headed by the Minister of the MoIWR. The SNWP states that the Council has two mandates, the first being to formulate the general policy for water resources and the second one being to formulate a long term federal plan for the "optimal and balanced use of water resources" as well as to determine water sector priorities. (MoIWR, 2000: 11). No increase in Goal Attainment is observed however, as both the Pre-NBI and Post-NBI policies contain the desired indicator.

Establish a monitoring and evaluation plan of progresses made

Specific mention is made to the continuous monitoring of large dams and irrigation schemes throughout Sudan in the NCS. The operation of the Sennar, Roseires and Khashm El Girba Dams are under continuous surveillance and changes to operating procedure are made as they are needed. Crop water requirements in irrigation schemes are periodically reviewed as well. Drinking and sanitation water requirements are also under continual monitoring and are adjusted according to rural and urban population size and industrial development constraints (Mohamed, 1998). The Goal Attainment score remains the same for the current, Post-NBI water policy, resulting in no change. It is up to the now formed National Water Resources Council to monitor and evaluate the water sector policy and program on a regular basis, as previously discussed. Monitoring and evaluating are listed as components that need strengthening in the SNWP. Four points are made that needs to be developed at the state and federal level: 1) initiating monitoring programmes for uses from different water resources; 2)

improving and expanding analytical and data management capacities; 3) assessing performance of water supply and sanitation agencies; and 4) assessing performance of water resources management agencies (MoIWR, 2000). Aside from these general guidelines, the use of irrigation water is singled out for intense monitoring and evaluation programs, as irrigation consumes the largest quantity of water in Sudan.

Secure plan of funding in place whether it be domestic or FDI

Funding plans have remained intact from the Pre-NBI water policy to the Post-NBI water policy, resulting in a no change score for Goal Attainment. According to Hailelassie et al. (2008), the NCS as a whole was operated using three year budget plans but for the majority of programs, 60% of funding was provided through domestic sources (Government of Sudan) while the remaining 40% was obtained for foreign assistance or through international donations. The SNWP provides a plan for self-financing for the majority of its programs and projects. Under the Utilization section of the document it is stated, “Water supply and sanitation services should be self-financing. To ensure equitable allocation of resources, only poor communities should be subsidized to provide basic minimum water supply and sanitation services. Higher levels of services (urban water supply) should be financed by consumers and state government development budgets. To ensure the sustainability of water supply and sanitation services, a sound tariff policy should be established for various water supply and sanitation systems in different localities”(MoIWR, 2000: 20). External assistance is also requested to support the capacity building projects, though the SNWP does not elaborate on specific quantities needed.

4.6 Conclusion

It has been shown here that the national water policies of Sudan have witnessed a modest increase in Goal Attainment in relation to the NBI Policy Objectives, and thus the NBI. The Pre-NBI water policy contained 7 of the policy contents indicators, while the Post-NBI water policy contained 10 of the policy contents indicators resulting in a 43% increase in Goal Attainment, or 3 policy contents indicators. An identical analysis will now be conducted on the national water policies of Egypt.

5. EGYPT: THE DOWNSTREAM HEGEMONIC RIPARIAN

5.1 Introduction

It is a safe assumption that the majority of people think of Egypt and the Nile as synonymous, and this is indeed not false; frankly Egypt would cease to exist without the Nile's waters. While Egypt covers approximately 1 million km², its population of 80.5 million only inhabits 5.5% of the landmass due to the harsh desert terrain outside of the Nile valley (Abdel-Gawad, 2007)⁶. In urban areas the population density is over 1, 500 inhabitants per square kilometer (FAO, 2008). Faced with such a small percentage of inhabitable land, population growth is a serious issue in Egypt and is one of the most, if not the most, pressing challenge towards sustainable development.

Under the leadership of President Hosni Mubarak since 1981, Egypt has been kept in a state of emergency since the assassination of Mubarak's predecessor Anwar Sadat in 1981. This Emergency Law allows the government to imprison individuals without a reason, for as long as they want without a trial. Coupled with rigged elections and authoritarian rule, lack of free speech and press, Mubarak's Egypt has become an almost anti-progressive state (Ottaway, 2010). An article from the New York Times written by Michael Slackman (May 4, 2010) sums up the daily activities taking place throughout Egypt that have been sparked by frustration and anger of the Egypt people:

The streets outside Parliament have been occupied for months by protesters demanding better wages. Strikes have broken out all over the country over issues as varied as fresh water and better pay. Political activists and opposition members of Parliament demonstrated this week to demand an end to the emergency law, which has allowed the president and his allies to block the development of any viable political opposition.

This type of dictator-like rule has also been the case for the management of the Nile River; Egypt has historically and is currently enjoying a hegemonic position in relation to Sudan and Ethiopia. Its near 100% reliance on the Nile as its only water source has kept Egypt in good favor in the international donor community, and the World Bank. Out of the three countries of the ENB, Egypt has the strongest economy, the mightiest military, the largest technical, financial and intellectual capacity, and the 1929 and 1959 treaties to bolster its position in the hydro political game of Nile River Basin management.

In this chapter focused solely on Egypt, the sub-questions S2 and S3 will be addressed and answered for the Pre- and Post-NBI water policy contents. First a brief description of Egypt's hydrological situation will be given, followed by descriptions of each the Pre-NBI water policy and the Post-NBI water policy. The presence of the policy contents indicators in each of the policies will then be discussed along with the respective Goal Attainment scores for each policy.

5.2 Hydrological Situation

Since the completion of the Aswan High Dam in 1970 Nile flow has been completely controlled; Egypt no longer has to rely on the annual floods of yore. The Aswan High Dam

⁶ At its widest, the Nile Valley is a 2-3 kilometers wide, not leaving much room for agriculture or other land uses (FAO, 2008).

can store up to two years worth of water in the man-made reservoir of Lake Nasser. “Except for the Nile itself, every bit of the Egyptian water conveyance system is man-made and thus an expression of planned effort. The Egyptian irrigation system is tremendous in size and complexity. It consists of the Aswan High Dam, eight main barrages, approximately 30,000 km of public canals, 17,000 km of public drains, 80,000 km of private canals (*mesqas*) and farm drains, 450,000 private water-lifting devices (*sakias* or pumps), 22,000 public water-control structures, and 670 large public pumping stations for irrigation”(Hvidt, 1995).

Egypt relies upon the Nile almost entirely for its water supply. Winter rainfall is limited to a narrow strip of the Northern Delta (maximum 1.5 BCM/yr) and there is a potential of 2 BCM/yr for rainfall harvesting in the Sinai. However, water planners often do not add rainfall to Egypt’s water resources because of its spatial and temporal variability. Thus, the Nile-Lake Nasser system is considered the only renewable source of fresh water. At present, this system constitutes 95% of Egypt’s total water resources (Mohamed, 2001: 1). Minimum and maximum rainfall averages range from 0 to 120mm/year thus classifying Egypt as a water scarce country (UNEP, 2000).

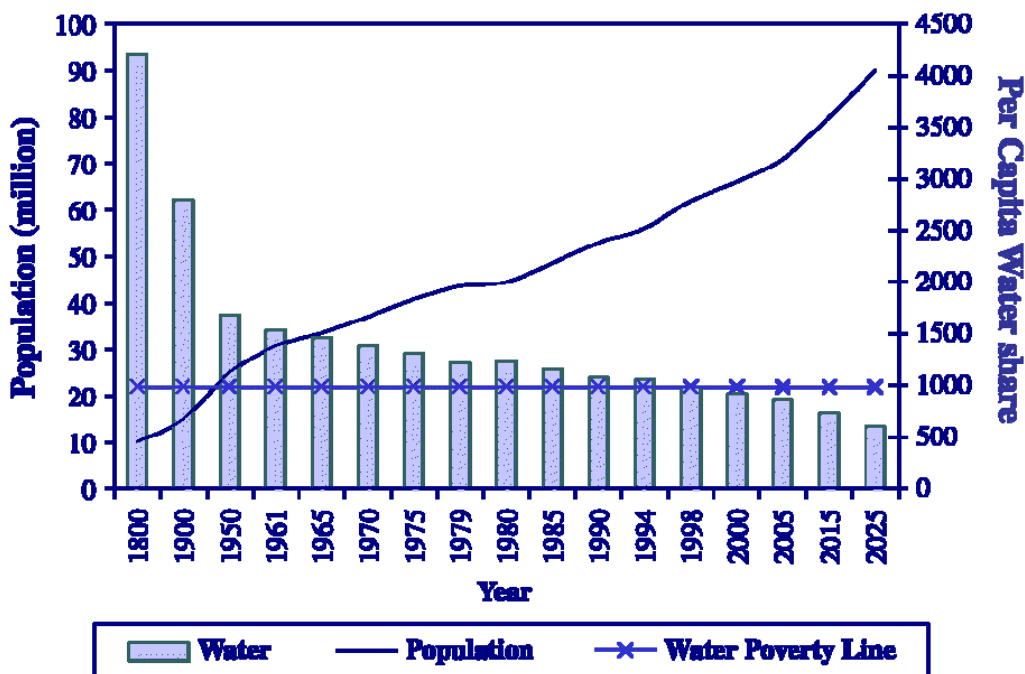


Figure 8: Population growth and per capita water share in Egypt (m³/year)
Source: Abdel-Gawad, 2007.

Figure 8 above depicts the population of Egypt on the incline, and as expected with a fixed amount of water each year, the per capita allowance has continually declined, as shown by the light blue bars. It can be said to be standard information that a nation is ‘water scarce’ once the per capita share is below 1,000 m³. As can be seen in Figure 8, Egypt has been a water scarce nation since 1998, and future population growth estimates do indeed paint a grim picture. According to Dr. Shaden Abdel-Gawad (2007), President of the National Water Research Center in Cairo, “Egypt has reached a stage where the quantity and quality of water is imposing limits on its economic development” (342). It becomes imperative that Egypt must rely on more efficient uses of water as well as advocate and practice conservation measures.

Despite this, Egypt has embarked on many desert land reclamation projects, aptly entitled, Mega Projects that hope to increase the percentage of inhabited land from the current

5.5% to roughly 25% (Abdel-Gawad, 2007). The most infamous of these Mega Projects is the Toshka Project. To the west of Lake Nasser in the south of the country is an ambitious project that plans to reclaim 1.4 million hectares of desert sand into irrigated and arable land for food production and residential neighborhoods (Boctor, 2007). Toshka's goal is to allow for 6 million Egyptians to reside and grow food in the newly reclaimed desert area. However, it is estimated that an additional 5 to 9 BCM of water would be needed annually to sustain the area. As shown, Egypt is already water scarce and currently utilizes all of the 55.5 BCM of Nile water allotted from the 1959 agreement; where will this water come from? According to Boctor (2007), independent estimates claim that it takes 100 reclaimed hectares of land to produce an equal output of one hectare of existing soil in the Nile Valley. Agricultural uses demand approximately 82% of Egypt's water while accounting for only 25% of the national income, which leads to the question if domestic food production is worth the price (Abdel-Gawad, 2007).

5.3 Pre-NBI Policy: Master Plan for Water Resources Development and Use

The Master Plan for Water Resources Development and Use (MWP) is a joint project of Egypt's Ministry of Irrigation (MoI, now Ministry of Water Resources and Irrigation), the UNDP and the International Bank for Reconstruction and Development (IBRD). Launched in 1977, continuing into the 1980's and the first sections published in 1982, the MWP was the first attempt to create a master plan for all water uses throughout the entire country. However, the MWP is not necessarily a water resources development plan as such, but acted more as an initial effort to obtain all the information necessary to create improved planning capabilities within the water sector as a whole (Hvidt, 1995).

Two sets of objectives are given, the first related to the "preparation and evaluation of development plans" and the second referring to "supporting studies and analyses" (MoI, 1984). The first objective entitled Planning Objectives, lists the following priorities:

- 1) Agricultural Growth,
 - i. within this objective there are three scenarios listed that vary the amount of water available based on various growth rates in the agricultural sector, new lands development, and the completion of new supply projects (ie, Jonglei Canal).
- 2) Supply growing demands for municipal and industrial water,
- 3) Supply all other uses,
- 4) Evaluate and compare the plans on the basis of
 - i. Effective use of available water.
 - ii. Economic performance in the agricultural sector.
 - iii. Investment required, amount and timing.
 - iv. Social impact (employment).
 - v. Environmental Concerns.
 - vi. Energy Requirements.

The second objective entitled, Supporting Studies, lists the following seven sub-objectives:

- 1) Determine the investment required and the incremental cost of water for projects to increase the supply including upstream water conservation projects, drainage re-use projects, and wastewater treatment.

- 2) Determine the water required to support agricultural uses now, to serve expanded agriculture set out in the 5-year plan, and to serve anticipated production goals to the year 2000. Examine the impact of selected agricultural policies on water requirements. Compute economic rate of return and returns to water for new lands and rank accordingly.
- 3) Determine the water requirements for municipal and industrial use now and to the year 2000. Estimate the amount and quality of wastewater and the approximate cost of treating the effluent so that it is suitable for agricultural use.
- 4) Estimate the water requirements for all other uses.
- 5) Determine the operation, maintenance, and replacement costs for the present river regulation, irrigation, and drainage system. Identify needs for deferred maintenance. Compute the present cost of water.
- 6) Identify environmental concerns.
- 7) Develop, test, and use basic data and computational methods necessary for all the above work.

The MWP also prioritized the satisfaction of water needs for various sectors. First, municipal, industrial, navigation, and unexpected spills should be accounted for. This is followed by water use on old agricultural lands, and thirdly, water for the use of land reclamation is given the lowest precedence (Hvidt, 1995).

5.4 Post-NBI Policy: National Water Resources Plan 2017

Egypt has a history of continuously updating its water policies to take into account new developments. However, the current water policy plan is one that took many years to develop and is designed to cover a 20 year time span. The National Water Resources Plan 2017 (NWRP), published in 2005 is not the current water policy per se, yet the plan of the current policy implementation.⁷ Three broad national goals are contained within the document: 1) develop new water resources 2) improve the efficiency of present water uses and 3) protect the environment and reduce water related health hazards (MWRI, 2005). The main objective of the NWRP is “To support the socio-economic development of Egypt on the basis of sustainable resource use (surface water and groundwater), while protecting and restoring the natural environment” (MWRI, 2005: 3-6). Hence, the goals and objective go hand in hand with each other. The objective bears a striking resemblance to the mission statement of the NBI as it contains the two main topics of socio-economic development and sustainability. The NWRP also states that its strategy is largely based upon the ideals of IWRM, most specifically the increase in stakeholder involvement and greater attention paid to environmental concerns.

The Plan is intended to guide future actions in both the public and private sectors for optimum management and development of water resources so that individuals and society benefit. The NWRP is also different from previous policies in that for the first time the policy contains “the most likely scenario; it is pessimistic”, meaning that Egypt no longer assumes that additional water sources will be obtained from the Nile in the near future, such as the completion of the Jonglei Canal in Sudan, and thus sticks to the 55.5 BCM of water from the

⁷ The policy document itself is not available to the public, yet the NWRP is deemed acceptable for analysis as the objectives and plans contained within the NWRP are equivalent.

1959 agreement allocation (Dr. Hussam Fahmy⁸, personal communication, 2 May 2010). Therefore any additional water sources that Egypt may possibly acquire are slated to come from sources such as groundwater, desalination or recycled wastewater. The plan does mention that a future increase in deep groundwater withdrawal from the Western Desert could add up to an additional 3.5 BCM a year, but these figures are very uncertain as little is known about the Western Desert aquifer. The plan also states that the groundwater is indeed fossil water, and therefore should not be regarded as a sustainable solution (MWRI, 2005).

The NWRP relies upon scenarios as in the WMP. The base case or present situation is given as the state of affairs in 1997. The reference case is the state of the water system if no additional measures are taken in the year 2017. This reference case will be used to compare the three modeling scenarios and projections presented in the NWRP, the goal being that the scenarios in the NWRP will provide a better outcome than the reference case. Three scenarios created are the ‘most likely’, ‘more favorable’, and ‘less favorable’. The ‘most likely’ scenario is constructed using the best estimates for the most relevant indicators: population growth of 1.62 %/year, loss of agricultural land due to urbanization of 26,000 feddan (10,400 ha)/yr, and the agreed supply from Lake Nasser of 55.5 BCM/yr. The ‘more’ and ‘less’ favorable scenarios are based on positive or negative viewpoints of future water availability (MoI, 2005: 4-4).

5.5 Presence of Policy Contents Indicators in the Egyptian National Water Policies

In this section, the results are given for both the Pre-NBI and Post-NBI Egyptian national water policies as they have each been compared to the framework that was created in the latter half of Section 3. Below in Table 4, each of the five NBI Policy Objectives is listed along with their respective measurable policy contents indicators. One column is ascribed to each of the Pre-NBI water policy (WMP) and the Post-NBI policy (NWRP) with a corresponding ‘+’ or ‘-’ to indicate the presence of that indicator in the respective policy.

Table 4: Goal Attainment Scores for Egyptian Pre- and Post-NBI Water Policy

	NBI Policy Objectives	Policy Contents Indicators	Pre-NBI	Post-NBI
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	Opportunities for affected stakeholder group involvement indicated	-	+
		Special consideration given to women and young persons for participation	-	+
		Water needs of future generations are kept in mind	+	+
		Water allocated toward ecosystem maintenance	-	-
		Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits	-	-

⁸ Dr. Hussam Fahmy is a civil engineer and Vice Chair of the National Water Research Center of the Ministry of Water Resources and Irrigation located in Cairo, Egypt. The National Water Research Center provides the R&D for the Ministry of Irrigation and Water Resources.

Table 4 cont: Goal Attainment Scores for Egyptian Pre- and Post-NBI Water Policy

	NBI Policy Objectives	Policy Contents Indicators	Pre-NBI	Post-NBI
2	To ensure efficient water management and the optimal use of the resources.	Contains flexible policies with adaptive capacities for changing circumstances Seasonal allocations for water quantity Pledge to make use of best available technologies on both supply and demand sides Varying water quality standards for varying uses that can lead to economic savings Investment in infrastructure that control and deliver water resources	+ - + - -	+ + + +
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	Promote joint fact-finding with representatives from multiple riparian nations Information sharing is encouraged and data is widely available and unrestricted Establish conflict resolution mechanisms	- - -	- + -
4	To target poverty eradication and promote economic integration.	Initiatives present to reduce proportion of population that lives below US\$1 per day Initiatives present to increase employment, especially among women and young people Recognized preferred trading area within the ENB Customs tariffs decrease or abolishment within ENB	- + - -	- - - -
5	To ensure that the program results in a move from planning to action.	Create country-specific, inter-ministerial committees for coordination and implementation Establish a monitoring and evaluation plan of progresses made Secure plan of funding in place whether it be domestic or FDI	+ + +	+ + +
		Total Score/% of total indicators	7/35	12/60

As can be seen from the above Table 4, there has been a substantial increase in the number of indicators present in the Post-NBI policy compared to the Pre-NBI policy. The Pre-NBI policy, the WMP of 1982 contains 7 out of 20 indicators or 35%. The Post-NBI policy, the NWRP of 2005 contains 12 out of 20 indicators or 60%. It may thus be concluded that the current Egyptian water policy does indeed contain the NBI Policy Objectives to a greater extent than previously, within its water development plans for the future.

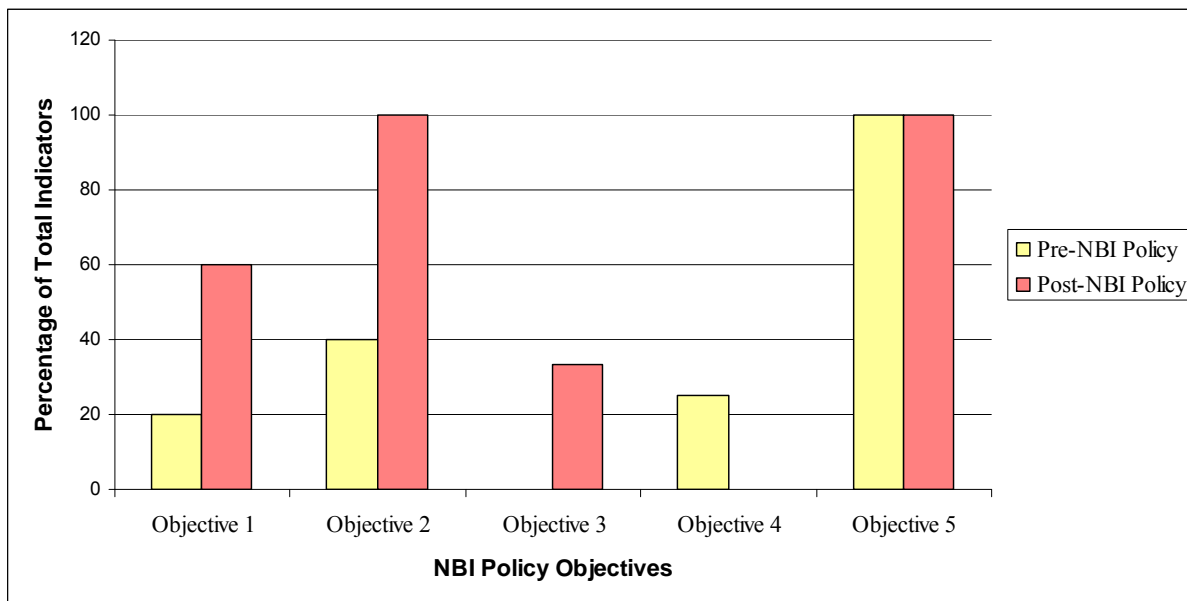


Figure 9: Pre- and Post-NBI Scores for Egyptian water policy according to NBI Policy Objectives

Above in Figure 9, is a graphical representation of Egypt’s scores for both its Pre- and Post-NBI water policies, separated into the five NBI Policy Objectives. The graph shows an increase in the number of indicators in the Post-NBI Policy as compared to the Pre-NBI Policy in three out of the five objectives, numbers one and two and three. The highest score belongs to the fifth objective, showing no change as both the Pre-NBI and the Post-NBI Policy obtained 100% of the indicators. The Post-NBI policy has made an increase in Objective 3, with one-third of the indicators present as opposed to zero indicators of the previous policy. An interesting result occurred for Objective 4 in where a greater percentage of indicators were present in the Pre-NBI policy (25%) than the Post-NBI Policy (0%). The scores will now be further elaborated upon by discussing each indicator in further detail.

5.5.1 Objective 1: To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples

Opportunities for affected stakeholder group involvement indicated

In the previous water policy, the WMP makes no mention of including affected stakeholder groups on any level of the policy making process. However, Goal Attainment does increase in the current, Post-NBI water policy. Contrary to the WMP, the NWRP focuses many efforts on including participation from all levels of society. Water boards and WUAs have a prominent place in the NWRP. Eventually part of the MWRI’s responsibilities will be transferred to local Water Boards. To start the Water Boards will cover an area of 4,000 to 5,000 feddan (1,600 to 2,000 hectares) and eventually cover larger areas of 45,000 to 50,000 feddan (18,000 to 20,000 hectares). The Water Boards will be responsible for the management and distribution of water from the mesqas, or tertiary canals, to individual farmers. Since farmer’s water needs will tend to vary depending on crop type and seasonal variations, the WUAs will be formed and provide a platform for the farmers to discuss individual distribution issues.

NGOs also have a place in the NWRP. The plan recognizes that it is largely a top-down effort where national ministries and the main stakeholder. However a scheme for including civil society is given, “This national plan will be translated into more de-central

plans that will be more action oriented. The development of those local action plans and the implementation of the plans will require an active role of local stakeholders, including NGOs and individual citizens. Related to the involvement of NGOs and individual citizens in the planning and implementation of water resource development activities, there is a need to enhance the ‘ownership’ feeling of the farmers and other citizens towards public property. Actions will be taken to stimulate this ownership” (MWRI, 2005: 5-39). Hence various opportunities are given or will be given in the near future for affected stakeholder group participation.

Special consideration given to women and young persons for participation

Along with the first indicator the Goal Attainment score is zero for the Pre-NBI policy, the WMP, yet increases in the Post-NBI policy, the NWRP. The WMP also does not mention any special attention towards involving the groups most often ignored in the policy making process; women and young persons. Special attention is however paid to women in the NWRP. Explicit instructions are given to expand the involvement of women in WUAs, develop awareness campaigns for women in rural communities, and to organize training courses for the MWRI as a whole on gender issues in Egypt. These measures come subsequently after the NWRP acknowledges that the role of women needs to be strengthened in decision making. The Plan also distinguishes the fact that societal and cultural norms greatly influence the differing opportunities and challenges that men and women face. It is important for women’s point of views to be taken account of in water management planning as women tend to be the primary caregiver of the household and are more intimately involved with the daily use of water. Nevertheless the plan remains realistic, or hesitant depending on point of view, by then stating, “However, it should be borne in mind that changing attitudes of men and women is a slow process... Generally many factors influence the interest and willingness of people to participate actively in discussions and decision making processes. It is a process in which some people immediately take the opportunity, while others will follow slowly” (MWRI, 2005: 6-27).

Water needs of future generations are kept in mind

Both the Pre- and Post-NBI water policies contain sufficient plans for the water needs of future generations, resulting in a no change in score for the Goal Attainment of this indicator. The WMP relates to the water needs of future generations by always keeping in mind the future growth of Egypt. In Chapter 5 of the document, Findings and Recommendations, there are two instances where this future population is accounted for. Article 5.05 states that “...the present surplus of water supply is small and demands are growing, and immediate investigation and design program should be launched so that new supply projects can be accurately costed, funded, and implemented” (MoI, 1984: 25). Thus a research and development recommendation is made so that future populations will also have an adequate water source. Secondly, Article 5.08 recognizes that estimates about future water demands are based on assumptions of future population growth. Therefore, patterns of population growth ought to be monitored in order to best estimate the future demands in all sectors.

Egypt is vastly aware that its rapidly expanding population is the main reason for its current water scarcity situation. The NWRP takes a different spin on the water needs of future generations by focusing on family planning awareness campaigns. A national population policy was formulated in 1973 and again updated in 1995 to stress the importance of population control in terms of socio-economic development (MWRI, 2005: 2-25). The NWRP emphasizes the ideals presented in the population policy and promotes the family

planning awareness campaigns that the Ministry of Health and Population are responsible for as a means of protecting the water rights of future generations.

Water allocated toward ecosystem maintenance

Ecosystem maintenance for purely the ecosystem's sake is not a part in either of the Pre- or Post-NBI water policies. The WMP does mention "environmental concerns" briefly in two sections of the document. In Part 1 of the Project Objectives, as mentioned in Section 6.2, the plan desires to "Evaluate and compare and plans on the basis of environmental concerns"(MoI, 1984: 3). Subsequently, the WMP also has a goal to "Identify environmental concerns" within the second set of objectives also listed in Section 6.2 (MoI, 1984: 4). These objectives are not further discussed or clarified as to their meanings and therefore it can not be assumed that they refer to ecosystem maintenance. While the NWRP does discuss environmental concerns as a goal of the plan, it only does so from an anthropocentric point of view; hence water quality issues are only addressed in terms of how they impact humans, not the environment or other species. Therefore, water in terms of quality or quantity is not reserved solely for ecosystem management or for a healthy surrounding environment. A change in Goal Attainment can therefore not be documented here.

Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits

Benefit-sharing mechanisms, domestic and international, were wholly absent in the WMP, as they are in the NWRP as well. However, the NWRP briefly mentions that "Co-operation with the riparian countries of the Nile Basin is expected to lead to additional inflow into Lake Nasser" but does not go into details as to how this 'additional inflow' will be obtained (MWRI, 2005: xix). Since neither the Pre-NBI nor Post-NBI water policy contains benefit-sharing mechanisms, an increase in Goal Attainment does not occur.

5.5.2 Objective 2: To ensure efficient water management and the optimal use of the resources

Contains flexible policies with adaptive capacities for changing circumstances

Goal Attainment here shows no increase, but not because flexible policies are absent from the policies. Quite on the contrary, both the Pre- and Post-NBI water policies of Egypt are inherently and positively flexible. The WMP is an innately flexible document as the entire policy is written around three differing scenarios based on available water supplies as well as the demand of various sectors including municipal, industrial, navigation and spills, and evaporation losses. Each of the three scenarios contains data for four yearly checkpoints over a 20 year period; 1980, 1985, 1990, and 2000. The largest difference in the scenarios is the demand in agriculture for the new land developments. Scenarios 1 and 2 by the year 2000 allocate 11.5 BCM for agricultural demand in the new lands, yet Scenario 3 only allocates 4.2 BCM for the same year. The significance is related to the 1959 Agreement with Sudan, as Egypt is allotted 55.5 BCM as measured at Aswan. Through allocating 11.5 BCM, the total demand at Aswan measures 63 BCM, 7.5 BCM over Egypt's total allocation of the Nile. Scenario 3's allocation leaves total demand at 54.3 BCM, well under the 55 BCM limit. These demand scenarios represent diverse circumstances that may or may not occur depending on Egypt's water supply. Scenarios 1 and 2 rely upon new supply projects, mainly the Jonglei Canal to accommodate the additional water. Unbeknownst at this time however

was that the Jonglei Canal would not be completed by the year 2000, nor is it completed at the present time.

In concurrence with its predecessor, the NWRP also is determined to keep flexible and adaptive measures for an uncertain future. The NWRP claims that it will have an “open and rolling character, meaning that it is not static or prescriptive, and leaves room for individual stakeholders to further elaborate upon in relation to their own responsibilities” (MWRI, 2005: 6-1). Three scenarios are also given for a range of demand and supply situations. Since all of these scenarios are estimates of the future, the NWRP assumes that new data and insights will be obtained and periodic updates will need to occur. “It is intended that every five years a National Water Resources Plan is produced, each time with a 20-years’ planning horizon” (MWRI, 2005: 5-37). Unknown affects from climate change have also been included as it is hoped that climate change will increase rainfall in the Ethiopian highlands resulting in an increase of Nile water for Egypt (MWRI, 2005: 4-4).

Seasonal allocations for water quantity

It is known that the Nile in Egypt is very heavily regulated by the High Aswan Dam and the yearly floods that are a historical landmark of the region, are no more. However, the level of Lake Nasser does vary with the seasons and years depending on the weather patterns of the upstream countries that are Lake Nasser’s source. Currently, the release from Lake Nasser is at a yearly fixed rate of 55.5 BCM, yet there may be benefits to increasing or decreasing the release throughout the year (MWRI, 2005: 5-2). While the Pre-NBI policy, the WMP does not consider this option or the distinction between dry and wet seasons in upstream countries, the Post-NBI NWRP plays around with the idea leading to an increase in Goal Attainment. According to the NWRP, larger releases when the reservoir is higher would decrease the spill onto the Toshka Depression as well as reduce evaporation of Lake Nasser. Conversely, when Lake Nasser is at lower levels, the release should be reduced as well. A 10% release reduction when the reservoir is at lower levels would increase the amount of available water, over the long term, by approximately 2 BCM/yr (MWRI, 2005: 5-2). While the NWRP considers this option, for the time being it has been agreed that more research is needed before a decision of such magnitude can be made.

Pledge to make use of best available technologies on both supply and demand sides

The WMP relies upon technical information in the form of simulation modeling to more accurately predict water demand and supply of a given year. Since Egypt’s water supply is most heavily dependent on the cache at Lake Nasser, many modeling systems have been developed to regulate the inflow and outflow of the large man-made reservoir. Chapter 4: Methods and Models of the WMP refers to two specific modeling tools in Article 4.03, the Lake Nasser Simulation model and the Lake Nasser DP model. The Lake Nasser Simulation model intakes historical or synthetic flow input, abstractions and demands, and in turn computes the evaporation levels, releases, spills and power generation on a monthly basis. Supply levels are better established with this model and take the guess work as to how much water Egypt has at its disposal at any given time. The Lake Nasser DP model on the other hand is used more for the operation of the reservoir itself based on inflow probabilities and inputted objectives. Both of these models are good examples of the best available technologies of the time for water planning and management in the 1980’s.

Goal Attainment for this indicator shows no increase as the Post-NBI policy also contains plans to use best available technologies, primarily in the agricultural sector. Due to the fact that the overwhelming majority of water in Egypt is used for agriculture, it is fitting

that many of the best available technologies referred to concern irrigation. Light textured soils will also be used in all new development areas which will increase the absorption and distribution of water throughout the fields. Generally speaking, the NWRP strives to “gradually introduce modern [drip and sprinkler] irrigation techniques to replace traditional irrigation methods” (MWRI, 2005: 5-13). Simple yet effective measures are also discussed such as the implementation of low flush toilets and low flow shower heads in cities where demand for municipal and residential water use is greatest.

Varying water quality standards for varying uses that can lead to economic savings

The WMP does not mention varying degrees of water quality for various uses, only the quantity, not quality, necessary to satisfy the demands of the agricultural, municipal, and industrial sectors are considered. However, the situation changes in the Post-NBI policy as the reuse of drainage water in the agricultural sector is identified as a mode of water use efficiency in the NWRP. By mixing drainage water with existing canal water, water-savings can occur for further irrigated fields for only a percentage of ‘new’ water is necessary. Treated municipal and industrial wastewater is also considered for efficiency purposes. Primary treated domestic wastewater is suitable for non-food crops as well as silviculture, while secondary treated wastewater can be used for certain food crops where health risks for farm workers are less. Presently, more often than not, secondary wastewater is used (MWRI, 2005: 5-21). Goal Attainment has thus increased for this indicator.

Investment in infrastructure that control and deliver water resources

It has been stated earlier how Egyptian Nile control is based on a vast series of barrages, canals, and mesqas. The three act together to form a system of water delivery throughout the country, especially in the delta region. While the WMP is concerned with the quantity of water resources that need to be available for each sector, no mention is given to how the water will be transported from the Nile or how to maximize the efficiency of water transport. On the other hand, the NWRP aims to improve the irrigation distribution and overall efficiency through the renovation of branch and distributary canals, downstream water control and conversion from rotational to continuous flow, and the improvement of mesqas by taking them from low level canals to raised canals or even pipelines to prevent spillage (MWRI, 2005: 5-10). Therefore, Goal Attainment has indeed been increased in the Post-NBI water policy as compared to the previous Pre-NBI water policy.

5.5.3 Objective 3: To ensure cooperation and joint action between the riparian countries, seeking win-win gains

Promote joint fact-finding with representatives from multiple riparian nations

Neither the Pre- or Post-NBI water policies contain joint fact-finding measures for the riparians to engage in together, leading to no justified increase in Goal Attainment. Joint fact-finding with other riparian nations was not mentioned in the WMP; mention of other riparian nations was not given in general on any subject except for the possible completion of the Jonglei Canal in Sudan which in theory would increase the supply of Nile water to Egypt by 2.5 BCM/yr (MWRI, 2005: 5-46). The NWRP also does not place much emphasis upon joint fact-finding among the riparians. Little is said about co-operation on any level with the Sudan or Ethiopia aside from a brief section titled, ‘International Cooperation’. This section states that Egypt is a “strong supporter of the work of the Nile Basin Initiative and will continue to

do so” (MWRI, 2005: 3-13). Despite this statement of brotherhood, the majority of the section focuses on reiterating the 1929, 1959 and 1993 agreements between Britain, Sudan and Ethiopia respectively that emphasize Egypt’s “no harm” stance against upstream riparian “equitable use” position.

Information sharing is encouraged and data is widely available and unrestricted

As with the previous indicator, no mention is made of cooperating with the other riparians Sudan and Ethiopia in any fashion. As evidenced by the strict limitations of the availability of the WMP itself, water resource data is not widely available within Egypt, let alone to other riparians. As evidence to the changing times, an increase in Goal Attainment is observed in the Post-NBI water policy, the NWRP. The NWRP aims to change the lack of accessibility, at least between government officials. Under the plan’s General Institutional and Financial Measures, it is claimed that “it is essential that the different authorities have access to all data and other information on the status of the system and planned developments...What will be needed is to have a good overview of the kind of information and data that is available and that others can retrieve this information. Where possible, relevant co-ordination will take place to avoid duplication of activities” (MWRI, 2005: 5-38). The plan further states that better dissemination of pertinent information will lead to more effective water management methods.

Establish conflict resolution mechanisms

Conflict resolution mechanisms are not touched upon or mentioned within the WMP as relations with fellow Nile riparians are not a topic of discussion. Shall a conflict or disagreement arise; there is also no protocol within the NWRP for handling such situations; hence a claim for an increase in Goal Attainment can not be made.

5.5.4 Objective 4: To target poverty eradication and promote economic integration

Initiatives present to reduce proportion of population that lives below US\$1 per day

While 19.6%⁹ of Egypt’s population lives on or near US\$1 a day there are no measures to try to reduce this number in the NWRP, while poverty reduction initiatives are absent in the WMP entirely. Clearly, no positive increments in Goal Attainment are witnessed for this indicator.

Initiatives present to increase employment, especially among women and young people

As stated in Section 6.2 of this document, one of criteria on which to evaluate the scenarios of the WMP is based on the social impact, and more specifically the impact on local employment. While the objective of increased local employment is very briefly mentioned, it is recognized as a factor of concern and deserves mention here. A rare happening occurs here as Goal Attainment actually decreases in the Post-NBI water policy. In the currently governing water policy, employment opportunities for Egyptians are not expressly stated as an outcome, or a goal of the various construction plans that the NWRP contains.

⁹ Based on 2009 information. Sourced from World Food Programme, 2010. <http://www.wfp.org/countries/egypt>

Recognized preferred trading area within the ENB

The issue of trade in general is not a component of the Pre- or Post-NBI policies, ensuing in zero change in Goal Attainment. Trade with other countries, let alone with the other riparian nations of the ENB is not discussed or touched upon in the WMP; nor are policies that would favor ENB trading areas. An identical situation occurs in the NWRP as there are zero trade objectives or future goals mentioned for creating a preferred trading area with the ENB.

Customs tariffs decrease or abolishment within ENB

Since trade is not mentioned in the WMP, it comes as no surprise that a tariff reduction program for the ENB region is also not an element of the Pre-NBI Egyptian water policy. A similar fate is held within the NWRP. Initiatives to increase the economic integration of the ENB by tariff lowering or abolishment are not included in the policy plan. As with the previous indicator, a change in Goal Attainment can not be accounted for.

5.5.5 Objective 5: To ensure that the program results in a move from planning to action

Create country-specific, inter-ministerial committees for coordination and implementation

The Goal Attainment scores remain unchanged for this indicator as both the Pre- and Post-NBI policies contain actions for an already existing inter-ministerial committee, or plans to create a new and improved version. The creation of an inter-ministerial committee is not discussed in the WMP due to the simple fact that such a committee was already in existence when the WMP was realized. The duties that the Inter-ministerial Committee for Water Planning performs are listed in two instances. The first deals with the investment structure for each of the three scenarios. Explicitly, “The investment implications of the three scenarios much be discussed by the Inter-ministerial Committee for Water Planning to set limits on public expenditures for the various water related sub-sectors. Then the planning process can be repeated to see how development targets must be modified to stay within the investment constraints” (MoI, 1984: 16). The Committee has been pegged to be largely in charge of keeping the WMP financially sustainable. The second request is that the Committee spurs communication within the various ministries of Egypt, and to keep all the ministries informed of each other’s actions, and to place an emphasis on information collection and distribution between the ministries.

Similar actions are recorded in the NWRP which intends to develop one permanent Inter-Ministerial High Committee for Integrated Water Resources Management with a goal of incorporating all “water-related policy fields”. The NWRP pledges that a proposal to initiate such a committee will be developed, and will be known as the National Water Council (MWRI, 2005: 5-39).

Establish a monitoring and evaluation plan of progresses made

The Pre- and Post-NBI water policies take the practice of monitoring and evaluating seriously, and this is reflected throughout both policies, hence an increase in Goal Attainment does not occur. The WMP makes a significant effort in establishing a monitoring plan that can later be used for evaluation purposes. In order to monitor progress, goals or objectives must be made to know what to reach for. In Article 4.02 of Chapter 4, the first sentence of the Planning Sequence is to “Establish overall growth criteria for water planning purposes; population, rural/urban population distribution, national economic growth and consistent

sectoral growth” (MoI, 1984: 22). Further in the Planning Sequence are steps to assemble the plan components, evaluate the plan, and to compare plan evaluations. Egyptian water supply is also very focused on population growth, being that this is the largest national constraint to water security. In article 5.08 it makes a special mention of stating that the “growth in potable water requirements and municipal wastewater discharges should be reviewed periodically” (MoI, 1984: 26). The use of models discussed previously also reflects a type of monitoring and evaluation system as well.

Many monitoring and evaluation plans are considered in the NWRP, as well as strengthening existing programs. Due to the IWRM nature of the NWRP, many ministries that are involved with water are also mentioned, especially those that coordinate industrial activities. The following ministries are called upon to strengthen their institutional capacities so that their monitoring, permit issuance, and compliance measures are more effective: Ministry of Industry, Ministry of Health and Population, Ministry of Environment, as well as the MWRI. Further in the document, section 6.4 is devoted entirely to monitoring and progress reporting. A detailed description is given that all stakeholders must follow that includes annual progress reports of a one page report per measure that they are responsible for. Each report must contain what each measure aims to achieve in quantifiable terms, the progress of the implementation so far, to what extent the aim has been met, and the identification of bottlenecks that have hampered implementation. These progress reports will in turn “enable the NWC to perform an overall evaluation of the implementation of all plans...As such it will contribute to the next round of planning” (MWRI, 2005: 6-14). The individual progress reports will then be consolidated by the NWC into an overall annual progress report on the NWRP with their recommendations and be presented to the Cabinet.

Secure plan of funding in place, domestic of FDI

Funding plans are stated in both the Pre- and Post-NBI water policies as a means of carrying out the policies’ respective implementation plans. Thus no increase in Goal Attainment transpires as the indicator is present in both policies. An investment plan protocol for the MWP is briefly given responsibility to the Inter-ministerial Committee for Water Planning. Article 5.11 of Chapter 5 states that “A large investment must be made to implement any of the three MWP development plans and the scheduling of that investment is uneven. An acceptable level of investment and schedule should be approved by the Inter-ministerial Committee for Water Planning and fed back into the Water Planning process”(MoI, 1984: 27). The plan also reveals that at least some of the investment came from public sources. Domestic sources will also provide the majority of the investment funds needed to carry out the NWRP’s objectives and rather bluntly states, “the stakeholders...that are responsible for the implementation of the measures...In general this means that they are also responsible to provide the funds necessary to do so”. However, this does not mean that each stakeholder is not permitted to request funds from outside donors or recruit technical assistance (MWRI, 2005: 6-5). Currently, LE145 billion (20.8 billion Euro) are the total investments needed for the period of 2003-2017 for the various projects contained within the NWRP. The shares of investment are domestic; the Ministry of Housing, Utilities and New Communities (62%), the Ministry of Water Resources and Irrigation (32%), other related ministries (1%) and the private sector (5%) have invested (MWRI, 2005).

5.6 Conclusion

It has been shown here that the national water policies of Egypt have witnessed an increase in Goal Attainment in relation to the NBI Policy Objectives, and thus the NBI. The Pre-NBI water policy contained 7 of the policy contents indicators, while the Post-NBI water policy contained 12 of the policy contents indicators resulting in a 71% increase in Goal Attainment, or 5 policy contents indicators. An analysis will now be conducted on the Goal Attainment levels of the national water policies of the ENB states together.

6. GOAL ATTAINMENT IN THE RIPARIAN STATES

6.1 Introduction

As previously shown, the relationships between the riparians of the ENB have been primarily conflictual throughout time, largely consequential to the opposing views of Nile water management and allocation. The purpose of this chapter is to expose how the nations “stack up” against each other in terms of Goal Attainment through the inclusion of the policy contents indicators that correspond with the NBI Policy Objectives within their respective national water policies. The results obtained in Chapters 4, 5 and 6 will be used here for the comparative analysis. The second and third sub-questions S2 and S3 are here answered again for the individual countries, and in accordance to each individual NBI Policy Objective. This is conducted to gain insight into which areas of the NBI the riparians have achieved the highest Goal Attainment as well as the lowest.

6.2 Overall Comparison of Goal Attainment

This section shows to what extent each country’s water policy embodies the total set indicators used to measure the NBI Policy Objectives in relation to the other riparian states of the ENB. The results shown in Figure 10 clearly illustrate the answers to the two sub-questions. The graph shows that the three countries scored relatively the same in their Pre-NBI water policies; Ethiopia 5% less than Sudan and Egypt. Yet the Post-NBI scores are more differentiated. Ethiopia’s current WRMP contains 70% of the total indicators; Egypt’s NWRP contains 60% of the total indicators, followed by Sudan’s NWP containing half of the indicators for a score of 50%. Ethiopia has thus “won” in a sense that their national water policy has achieved a higher Goal Attainment score than the other two countries of the ENB. The end result is the same for each country in that all three Post-NBI water policies increased their Goal Attainment scores from the scores of their Pre-NBI water policies.

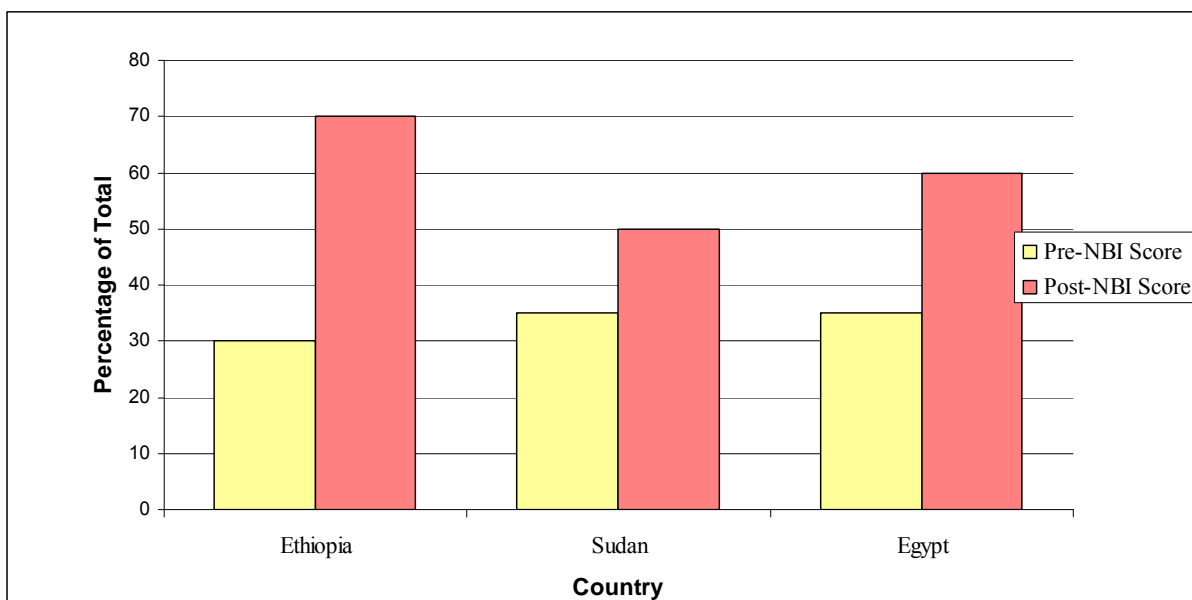


Figure 10: Total Indicator Presence in Pre- and Post-NBI Water Policies of the ENB

Below in Table 5 the numerical representation of Figure 10 is given. The Pre-NBI and Post-NBI Goal Attainment scores are given in numbers of indicators as well as the percentage of total indicators. The last column in Table 5 shows the percent change from each countries Pre-NBI score to the Post-NBI score. Ethiopia by far had the largest increase with a 133% change. Egypt has the next highest with a 71% increase in number of indicators between policies, while Sudan has had the lowest increase of 43%.

Table 5: Total Scores and Percentages of Indicators Present for ENB

Country	Pre-NBI Score	Pre-NBI Percentage (%)	Post-NBI Score	Post-NBI Percentage (%)	Percent change (Pre-NBI to Post-NBI)
Ethiopia	6	30	14	70	133
Sudan	7	35	10	50	43
Egypt	7	35	12	60	71

6.3 Goal Attainment Comparison in Relation to Objectives

In contrast to the above section, the purpose here is to evaluate the countries of the ENB in relation to each of the five NBI Policy Objectives. Goal Attainment areas that the countries are excelling in and areas in which the nations are falling short will be identified here. Below in Table 6, are the Goal Attainment percentage scores for each of the three countries, divided into the five NBI Policy Objectives and further differentiated into Pre- and Post-NBI water policies.

Table 6: Goal Attainment Percentage Score of Each Objective for Pre- and Post-NBI Water Policies of the ENB

		Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Ethiopia	Pre-NBI	20	40	0	25	66.6
	Post-NBI	80	80	33.3	50	100
Sudan	Pre-NBI	40	40	0	0	100
	Post-NBI	80	60	0	0	100
Egypt	Pre-NBI	20	40	0	25	100
	Post-NBI	60	100	33.3	0	100

Table 6, has been translated into graphical representation in the following Figures 11 and 12. Figure 11 represents the Pre-NBI Goal Attainment percentage scores for each country according to NBI Policy Objective. The most obvious observation is the lack of score for Objective 3 for all three countries. Sudan also has an absent score for Objective 4. The majority of the scores are relatively low, with none higher than 40% except for Objective 5, in which Sudan and Egypt both score a 100%.

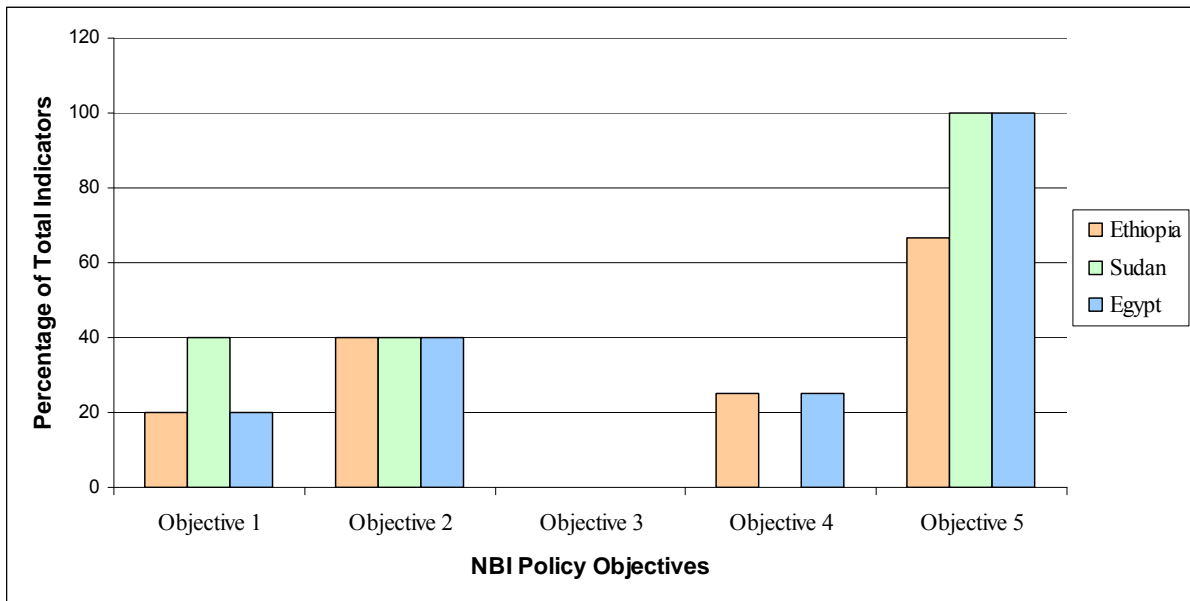


Figure 11: Indicator Presence According to NBI Policy Objectives for Pre-NBI Water Policies of the ENB

The Goal Attainment percentage scores of the Post-NBI water policies for each country according to NBI Policy Objective can be seen below in Figure 12. A dramatic increase can be seen in multiple objectives. Objective 1 sees an increase in score by all countries with the largest increase from Ethiopia. The same scenario goes for Objective 2, with all three countries again increasing their percentage scores, most notably from Egypt who achieves 100% of the measuring indicators. Objective 3 shows an increase in scores from Ethiopia and Egypt while Sudan remains the same at 0%. The only decrease of the entire study occurs with Objective 4, where Egypt declines from a 25% to a 0%. Ethiopia increases its score, while Sudan remains at a stagnant 0% for the same objective. An increase is also witnessed in Objective 5, as Ethiopia now also contains 100% of the indicators, joining Sudan and Egypt who have remained at 100%.

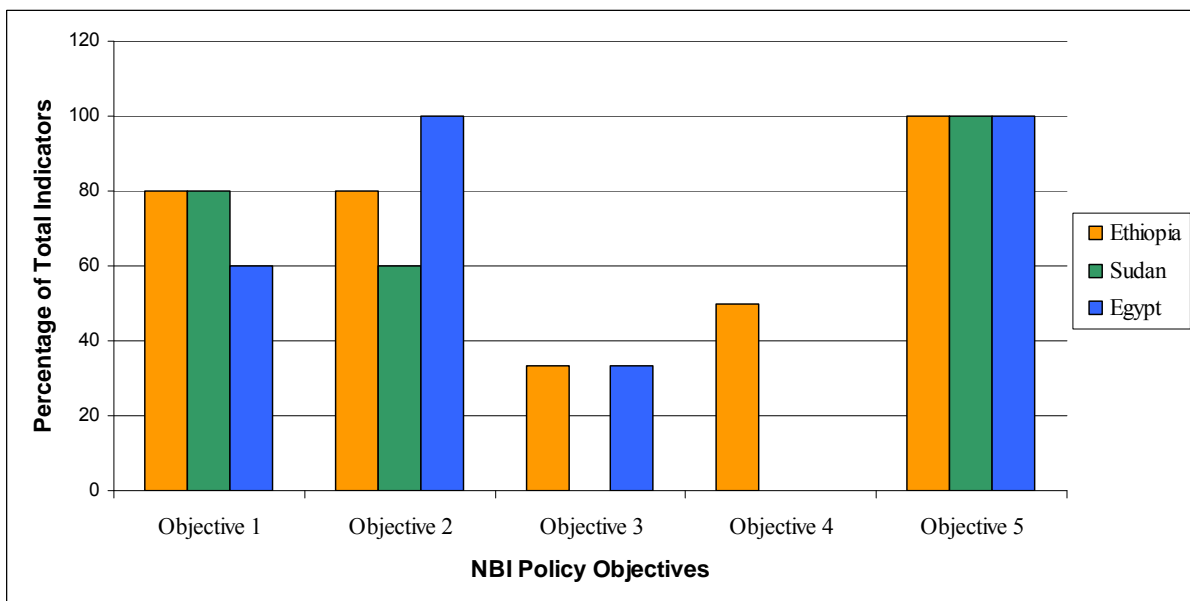


Figure 12: Indicator Presence According to NBI Policy Objectives for Post-NBI Water Policies of the ENB

Moving on to Figure 13, which shows a composite of Figures 11 and 12, all the results are depicted and comparisons between the countries and objectives can be seen. The largest lack in Goal Attainment clearly arises in Objectives 3 and 4, more so with Egypt and Sudan than Ethiopia. Yet even for Sudan and Ethiopia, Objectives 3 and 4 represent their lowest scores out of all five Objectives. Significant increases do occur for all countries in Objectives 1 and 2. Ethiopia marks an increase in Objective 5 from the Pre-NBI score of 66⅔ %, joining Egypt and Sudan who have continued their 100% score.

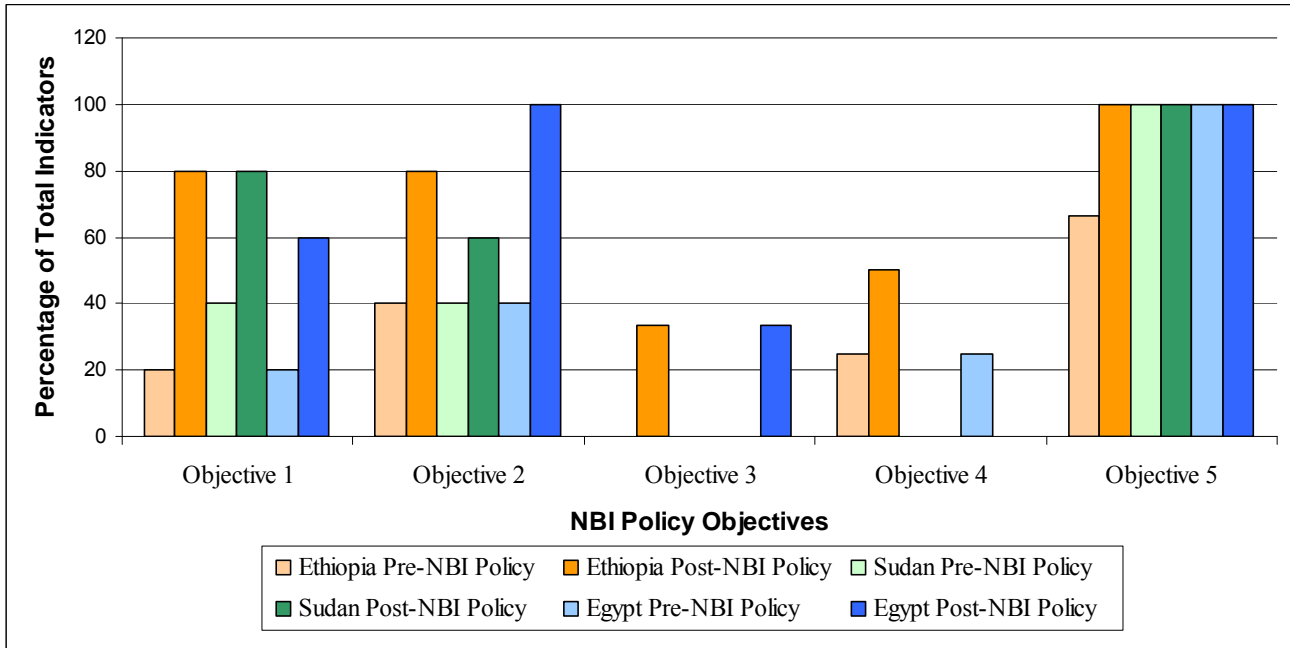


Figure 13: Indicator Presence According to NBI Policy Objectives for Pre- and Post-NBI Water Policies of the ENB

6.4 Conclusions

This chapter has shown an increase in Goal Attainment in the Post-NBI water policies as compared to the Pre-NBI water policies for all three countries of the ENB. The next section will explore this seeming NBI influence of the national water policies of the ENB by determining if the NBI has indeed been the catalyst responsible for the marked increase in Goal Attainment in the ENB states.

7. ESTABLISHING NBI CAUSALITY

7.1 Introduction

Surely, the overall increase in Goal Attainment may be due to other factors aside from the NBI. What else can account for the visible increase? The final sub-question S4 is addressed in this Chapter, *Do alternative underlying factors exist that can be identified for explaining the degree of influence of said policies?*

Through the identification of possible alternative explanations for the increase in Goal Attainment and their subsequent dismissal, the verification of the influence from the NBI is attempted. The alternative explanations will be described here, followed by a brief discussion of the policy contents indicators that showed an increase in Goal Attainment. The discussion of each indicator will include reasoning as to why the alternative explanations identified can be attributed as the possible cause for the increase in Goal Attainment for each respective indicator. The chapter concludes with a final discussion on Goal Attainment versus NBI influence.

7.2 Alternative Explanations for Goal Attainment Increase

Three alternative factors have been identified that could reasonably explain the increase in scores for the countries of the ENB, 1) Global IWRM adoption, 2) Environmental urgencies, and 3) Population growth. It is noted that this list is by no means exhaustive yet it is representative of what was found most often in current literature. Each of the alternative explanations is now briefly described.

Global IWRM Adoption

Today, many transboundary river basins have employed the ideals set for in IWRM into their own shared water resource plans as well as national water policies, many being in developing countries. Algeria's National Water Law of 2005, Thailand's National Water Policy of 2000, Nicaragua's General Law on National Waters of 2007 and India's National Water Policy of 2002 are just a few of the examples of IWRM being explicitly used to construct national water laws (Hassing et al, 2009). Below in Table 8, the five NBI Policy Objectives are listed along with concurrent citations from literature in IWRM and transboundary river management. Each citation shows an instance where the ideal of the Policy Objective was repeated in a work describing successful IWRM transboundary management components that the basins undertook. The many overlaps that occur showcase the great extent that the NBI has been influenced by IWRM.

Table 8: NBI Policy Objectives with concurrent scholarly references

	NBI Policy Objectives	Cited In
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	NBI, Ashton, 2002; Bernauer, 2002; Wolf, 1997; Giordano & Wolf, 2003; Ashton, 2003; Marty, 2001; Hamner & Wolf, 1998; Waterbury, 1997
2	To ensure efficient water management and the optimal use of the resources.	NBI
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	NBI; Uitto & Duda, 2002; Durth, 1996; Marty, 1997; Bernauer, 2002

Table 8 cont: NBI Policy Objectives with concurrent scholarly references

	NBI Policy Objectives	Cited In
4	To target poverty eradication and promote economic integration.	NBI; Ashton, 2002; Yoffe, Wolf & Giordano, 2003; Jaspers, 2003
5	To ensure that the program results in a move from planning to action.	NBI

The NBI itself has utilized IWRM during its formation as well as project implementation; this overlap in citations with the Policy Objectives does not come as a surprise.

Environmental Urgencies

Urgency in environmental factors is also a plausible reason for the increase in indicator presence in the Post-NBI water policies. The necessity for more efficient management increases as the environmental quality of a resource declines or through environmental processes the quantity of the resource itself decreases. It is a general consensus that climate change is indeed happening, and often times with predicted unfavorable results. No one can predict with 100% accuracy how climate change may affect the Nile River system, yet Bleier (1997) cautions that the flow of the Nile will decrease by as much as 25% over the next 20 to 40 years. According to Hvidt (1995), the intensity of water resource planning by a riparian depends on the scarcity of the resource; the greater the scarcity, the more planning is necessary to counteract it.

Population Growth

Population growth ties well into the previous discussion on environmental urgencies as rapid population growth can also create a situation of increased water scarcity. Population growth is for the most part the factor with the largest influence over the water scarcity situation in the ENB states. The Nile Basin as a whole has the highest population density in Africa and the population of the basin is expected to more than double and reach over 600 million by 2025 (El Zain, 2007). Egypt's population growth rate is just under 2% showing a slight decrease from previous years. An already stressed population is trying to survive on the narrow, hospitable strip of land on either side of the Nile (CIA, 2010). Sudan's population growth rate is higher at 2.15% and while Sudan has much more land mass than Egypt, a significant portion is either desert or inhabitable swampland (CIA, 2010). The direst of situations lies in Ethiopia with a population growth rate of 3.2%, the 7th highest in the world (CIA, 2010). Presently Ethiopia cannot feed its own people. The problems with its agricultural sector and foreign food aid coupled with more mouths to feed spell disaster in the near future unless an intervention is made.

7.3 Alternative Explanations per Policy Contents Indicators

Below in Table 7, the 12 indicators that experienced an increase in Goal Attainment in the Post-NBI water policies of the ENB along with the three identified alternative explanations are listed. For each indicator an 'X' is designated to symbolize which of the three alternative explanations can be given credit for the marked increase in the water policy contents.

Table 7: Attribution of Alternative Explanations According to Policy Contents Indicator

Policy Contents Indicators	Alternative Explanations		
	Global IWRM Adoption	Environmental Urgencies	Population Growth
Opportunities for affected stakeholder group involvement indicated (Egypt)	X		
Special consideration given to women and young persons for participation (Egypt, Ethiopia)	X		
Water needs of future generations are kept in mind (Sudan)		X	X
Water allocated toward ecosystem maintenance (Ethiopia, Sudan)	X		
Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits (Ethiopia)		X	X
Contains flexible policies with adaptive capacities for changing circumstances (Ethiopia)		X	X
Seasonal allocations for water quantity (Egypt)		X	X
Varying water quality standards for varying uses that can lead to economic savings (Egypt, Sudan, Ethiopia)			X
Investment in infrastructure that control and deliver water resources (Egypt, Sudan)			X
Information sharing is encouraged and data is widely available and unrestricted (Egypt, Ethiopia)	X		
Initiatives present to reduce proportion of population that lives below US\$1 per day (Ethiopia)		X	X
Create country-specific, inter-ministerial committees for coordination and implementation (Ethiopia)	X		

Many of the indicators are attributed a combination of two alternative explanations. Population growth is credited with seven indicators, while environmental urgencies are attributed to 5, along with global IWRM adoption. Evidence that each of the alternative explanations may be responsible for the observed increase in Goal Attainment will be discussed here, according to the indicators shown in Table 7.

Opportunities for affected stakeholder group involvement indicated (Egypt)

Egypt displayed an increase in Goal Attainment in their Post-NBI national water policy, the NWRP for the greater inclusion of stakeholder involvement. In the Executive Summary of the NWRP, IWRM is addressed directly as an impetus for stakeholder participation,

In common with current global thinking on how to solve present water resources problems, Egypt has adopted an Integrated Water Resources Management (IWRM) approach...In context of Egyptian water management the following principles are in particular important: water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels...Representatives of relevant stakeholders have been involved in developing this plan, both at a horizontal level (the various ministries involved) as well as vertically (governates, water boards, various user groups, etc). (MWRI, 2005: xvii).

Therefore it can be concluded that the recent global adoption of IWRM-based water management plans is the reasoning behind a greater depth of stakeholder participation in Egypt's Post-NBI water policy.

Special consideration given to women and young persons for participation (Egypt, Ethiopia)

An increase in Goal Attainment for women-centric participation was seen in both Ethiopia and Egypt. Similar to the previous indicator, the greater participation of women in policy making may also be attributed to the IWRM approaches made by Ethiopia and Egypt. While Ethiopia's Post-NBI policy, the WSS is not as explicit as Egypt's NWRP, it does state as an overall objective to promote the principles of Integrated Water Resources Management (MoWR, 2001b). Delving deeper in the WSS, the importance of community management, "particularly women's participation in the relevant aspects of water resources management" is included as a Guiding Principle (MoWR, 2001b: 2). As discussed in Chapter 2, IWRM is based on the Dublin Principles; the third one stating, "Women play a central part in the provision, management, and safeguarding of water" (Hassing et al., 2009). Logically speaking, if IWRM specifies that women deserve special attention in the management of water resources, and Ethiopia's WSS contains special provisions for women involvement and credits IWRM at its inception, then it is possible that the WSS contains these women specific goals as a result of adopting an IWRM approach. An identical logical argument is made for Egypt's NWRP, based on the results discussed in Section 5.5.1 of this report as well as the NWRP's commitment to IWRM displayed in the previous indicator's discussion.

Water needs of future generations are kept in mind (Sudan)

Sudan was the only riparian that showcased an increase in Goal Attainment for the acknowledgement of water for future generations. A combination of environmental urgencies as well as population growth may be attributed for this increase. The SNWP addresses future generations largely in the realm of water pollution, not in water quantity per se (refer back to Section 4.5.1). Water quality deterioration is currently seen in groundwater as well as in the numerous irrigation canals. The Nubian Sandstone aquifer is the largest in Sudan and is shared with neighbors Chad, Egypt and Libya. The SNWP designates approximately 4.1 BCM out of a possible 30 BCM as sourced from the Nubian Sandstone (MoIWR, 2000). Areas in central Sudan, the Nyala basin in the west and the Gash basin to the east are currently experiencing groundwater quality deterioration. While not the main source of water, the aquifer is of fossil origin and therefore recharge is slow and limited (El-Tom Hamad & El-Battahani, 2005). Water quality is also decreasing in the surface waters of the Nyala and Gash regions largely due to agricultural chemicals, and industrial and urban waste. Sedimentation and the uncontrollable growth of weeds are also wrecking havoc on irrigation canals across the country (El-Tom Hamad & El-Battahani, 2005). These environmental problems are aimed to only get worse with an increasing population, as is the case in Sudan. The most densely populated areas are those along the Nile and its tributaries, where the irrigated areas are located, as well as in areas with water supplies such as aquifers (El-Tom Hamad & El-Battahani, 2005). Hence, it is important for Sudan to keep the water needs of future generations in mind, so as not to continue the current trend of environmental degradation.

Water allocated toward ecosystem maintenance (Ethiopia, Sudan)

Goal Attainment increases were seen in Ethiopia's and Sudan's Post-NBI water policies in the realm of ecosystem maintenance. This indicator was again focused on ecosystem maintenance for the environment's sake, not for anthropocentric purposes. Global IWRM adoption is therefore argued here as the reasoning behind the inclusion of ecosystem maintenance in Ethiopia's WRMP and Sudan's SNWP. The definition used for IWRM in this research is the one created by the Global Water Partnership in 2000 (Rahaman & Varis, 2005, emphasis placed by the author):

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.*

Based on this definition of IWRM, the "sustainability of vital ecosystems" does not signify the preservation for the purposes of future human use, but the preservation as ecosystems in their own right and as habitat for flora and fauna. Ethiopia's adherence to IWRM principles in its Post-NBI water policy has previously been addressed and are here again utilized. While Sudan on the other hand does not explicitly state that the SNWP takes into consideration 'IWRM', all of IWRM's principles are included in the Overarching Policy Principles and Objectives of the SNWP (MoIWR, 2000). Twelve of these principles are stated in the policy document and include the IWRM principles: water being recognized as an economic good, water management should be done in an integrated manner at the lowest possible level, management should be undertaken with the participation of relevant stakeholders, sustainable utilization of water resources, and inter-departmental and inter-sectoral communication

should be included (MoIWR, 2000). The Post-NBI water policies of Ethiopia and Sudan have therefore included the IWRM principle of sustainable ecosystem maintenance. IWRM measures are also included in each policy as general guiding principles, linking the increase in Goal Attainment in ecosystem maintenance to an influence from IWRM adoption.

Benefit-sharing mechanisms that allow physical benefits to be separated from economic benefits (Ethiopia)

Ethiopia is the only riparian that showed an increase in Goal Attainment for the benefit-sharing mechanism indicator in its Post-NBI policy, the WSS. The rapid population growth that Ethiopia is currently experiencing along with environmental degradation is attributed here for the marked increase. The WSS is open to development projects that are owned with other riparian countries, while keeping in mind Ethiopia's interest (MoWR, 2001). Ethiopia's main interests are hydropower and irrigation water to grow food for its burgeoning population (Arsano & Tamrat, 2005). Recalling Wiedemann's (2005) argument, Ethiopia's internal food production is decreasing due to competition from foreign food aid and degraded land. According to Arsano & Tamrat (2005), two-thirds of the land in the Abbay and Tekeze river valleys has been drastically degraded due to poor farming practices. Millions suffer recurrent food shortages and famine as a result. Benefit-sharing mechanisms such as development projects shared with other riparians that could allow for Ethiopia to have more of the Nile's water in exchange for cheap electricity could literally save millions of lives. Hence population growth and environmental destruction can be credited as the underlying causes for this increase in Goal Attainment.

Contains flexible policies with adaptive capacities for changing circumstances (Ethiopia)

An increase in Goal Attainment for this indicator dealing with flexible policies occurs within the Post-NBI water policy of Ethiopia. The issuance of flexible policies in the WSS is concerned exclusively with crisis management pertaining to natural disasters such as drought and floods (MoWR, 2001b). Environmental urgencies combined with high population growth make a plausible argument as the reason behind this increase in Goal Attainment. The unpredictability of how climate change will affect the already scarred landscape of Ethiopia remains to be seen, yet it is forecast that erratic weather will become more frequent resulting in more droughts and floods. Droughts and floods have occurred intermittently throughout Ethiopia's history with devastating effects including loss of agricultural yield, livestock loss, famine, and death. In 2001, six million people (almost one-tenth of the population at that time) were exposed to famine and had to subsist solely on foreign food aid (Arsano & Tamrat). These effects are felt more intensely in a growing population; more people means more lives lost. Droughts, floods and the resulting famine that too frequently occurs are burned in the minds of all Ethiopians. These nightmares have in turned spurred action from the Ministry of Water Resources. Plans to combat these natural disasters, rather than react to them, are a component of the WSS as a result of environmental catastrophes combined with a growing population.

Seasonal allocations for water quantity (Egypt)

Seasonal allocations for water quantity maximization are witnessed in the Post-NBI water policy of Egypt, the NWRP. Environmental and population pressures are recognized as the underlying causes for this increase in Goal Attainment. Egypt's Lake Nasser is a massive man-made reservoir created after the construction of the Aswan High Dam completed in

1970. It is due to this reservoir, that Egypt no longer has to rely on the yearly floods of the Nile. However, the waters feeding into the Aswan High Dam are subject to the seasonal fluctuations experienced upstream in Ethiopia and Sudan. Therefore, Lake Nasser experiences high and low levels. According to the NWRP, larger releases when the reservoir is higher would decrease the spill onto the Toshka Depression as well as reduce evaporation. Environmental pressures at Lake Nasser are largely a result of its design. Lake Nasser is 298 miles long and 10 miles wide at its widest point, sitting in the middle of the desert evaporation is a constant battle (Boctor, 2007). Conversely, when Lake Nasser is at lower levels, the release should be reduced as well as a conservation measure. Population pressures can account for the reduced release. A 10% release reduction when the reservoir is low will increase the amount of available water over the long term by 2 BCM/yr (MWRI, 2005: 5-2). Since Egypt is the most water scarce country of the ENB, it is understandable that they would adopt any measures possible to increase their yearly water supply. This increase in Goal Attainment in seasonal allocations of water quantity is feasibly caused by Egypt's environmental and population growth concerns.

Varying water quality standards for varying uses that can lead to economic savings (Egypt, Sudan, Ethiopia)

All three riparians showed an increase in Goal Attainment for the varying water quality standards indicator. It is proposed here that pressures due to population growth have resulted in this Goal Attainment increase. Egypt aims to increase water use efficiency by reusing drainage water where appropriate in the agricultural sector. Treated municipal and industrial wastewater is also identified for various uses where drinking water is not an option. Referring to Figure 8 in Chapter 5, the water scarcity situation is clearly visible. Egypt has been chronically water scarce since 1998. The population is steadily rising at a rate of 2% per year. Its projected growth pattern sharply increases after the year 2015; water scarcity per capita will thus continue to increase as well. The reuse of wastewater in any manner possible is a method of stretching the available water resources to the highest capacity. Sudan acknowledges that more research needs to be conducted on the uses and benefits to using wastewater as an industrial coolant as well as treating wastewater from industry to be used in the agricultural and municipal sectors. Sudan is also a water scarce country with a per capita water budget of 714 m³ per person (calculated from 2010 data), well below the standard of 1,000 m³ water stress limit. Sudan is also in dire need of irrigation water to finally be able to fulfill its destiny as the 'breadbasket' of Africa. Using treated wastewater for irrigation purposes would significantly contribute to this goal. Lastly, Ethiopia's WSS creates plans to recycle wastewater when it is safe and healthy to be used in irrigation schemes and hydropower production. The population of Ethiopia is practically exploding with a growth rate of 3.2%, representing the 7th highest growth rate in the world (CIA, 2010). Irrigation water is desperately needed to bolster internal crop production, help to stabilize the economy and to reduce its escalating populations' reliance on food aid. Hence, for each riparian, population growth has created a situation where the variance of water quality standards through wastewater reuse has become a necessary component to their national water policies.

Investment in infrastructure that control and deliver water resources (Egypt, Sudan)

Goal Attainment in the realm of infrastructure investment has been obtained in the Post-NBI water policies of Sudan and Egypt. This change is accredited to population growth as the following evidence justifies. Sudan's SNWP gives the responsibility to the government to oversee the "upkeep of irrigation infrastructure to avoid frequent expensive rehabilitation

costs” including pumping units, sewage systems and septic tanks (MoIWR, 2000: 21). Urban and rural growth rates (2004 data) are 4% and 1% respectively. The difference observed is due to the mass migrations of citizens from rural to urban areas (El-Tom Hamad & El-Battahani, 2005). With urban areas experiencing a population influx, surely the infrastructure that control and deliver water resources needs to be expanded and more diligently maintained. Sewage systems and septic tanks would especially need increasing investment as there would be added pressure to the existing system to keep up with the expanding demand. Egypt’s water policy also manages population pressures through the investment in infrastructure. Egypt’s NWRP focuses on the improvement and overall efficiency in canal water distribution, largely for irrigation purposes (MWRI, 2005). This inclusion can be attributed to the growing population in Egypt’s current urban areas as well as its horizontal expansion plan. According to Dr. Mohamed El-Fetyany, an engineer with the Ministry of Water Resources and Irrigation, a total of 3.4 million feddan (1.4 million hectares) will be reclaimed from the desert for agriculture and human settlement (personal communication, 2 May 2010). The purpose of these new settlements is largely to ease the dense populations of Cairo and Alexandria by providing new lands for families to farm and live. Obviously, new settlements and new irrigation schemes require massive overhauls of irrigation and distribution canals to bring Nile water to these reclaimed areas. The case has thus been made for population growth as the impetus behind this increase in Goal Attainment.

Information sharing is encouraged and data is widely available and unrestricted (Egypt, Ethiopia)

The Post-NBI water policies of Ethiopia (WSS) and Egypt (NWRP) have each shown an increase in Goal Attainment for this indicator focused on information sharing. The Ethiopian WSS contains an eight-fold program designed to improve data collection, dissemination, and networking throughout Ethiopia as well as the region (MoWR, 2001b). The Egyptian NWRP contains a plan for improved data accessibility to government officials from all sectors, which in turn can be used to assist in regional cooperation with the other riparians (MWRI, 2005). Both of these policies also explicitly employ the principles of IWRM as previously discussed. According to Sadoff & Grey (2005), the ultimate goal of IWRM can be said to be achieved when the river basin is managed and developed as one whole system, rather than a sum of its various parts. By sharing information and data pertaining to water resources management, a step towards basin-wide management is accomplished. Riparians can more easily work together on multilateral utilization projects knowing basin-pertinent hydrological information. The overall adoption of information sharing is therefore included in both the Post-NBI policies of Ethiopia and Egypt as well as in the general premises of IWRM. Since both the WSS and the NWRP have stated that their general policies are based on IWRM principles, global IWRM adoption is therefore held accountable for the observed increase in Goal Attainment.

Initiatives present to reduce proportion of population that lives below US\$1 per day (Ethiopia)

Ethiopia is the only riparian of the ENB that achieved an increase in Goal Attainment for this poverty reducing indicator in its Post-NBI water policy. Over half of Ethiopia’s population currently survives on less than US\$1 per day (CIA, 2010). Since approximately 85% of the population is involved in the agricultural sector, the WSS aims to reduce the amount of people in poverty through the most effective route possible, an increase in sales of local foodstuffs (MoWR, 2001b). The plight of the Ethiopian people when it comes to agricultural

productivity has been discussed on multiple occasions throughout this research. Environmental degradation of farmland due to poor cultivation practices and frequent drought, plus rapid population growth is once again diagnosed as the catalyst behind this Goal Attainment increase. These two factors, environmental urgencies and population growth have acted together to help create this low internal agricultural productivity which requires the poverty reduction measures found in the WSS.

Create country-specific, inter-ministerial committees for coordination and implementation (Ethiopia)

An increase in Goal Attainment for this indicator was only seen in the Post-NBI water policy of Ethiopia. The creation of an inter-ministerial committee for the coordination and implementation of policies can be attributed directly to influence from IWRM adoption. A significant component of IWRM is of course the *integration* of water resources management; meaning an incorporation of all areas of the water sector including environmental, economic, and political considerations into one comprehensive management plan. An objective of the WSS of Ethiopia is to promote the principles of IWRM. The policy has done so by stating as a goal to “establish effective institutions to secure sound institutional basis for sustainable development and management of water resources” (MowR, 2001b: 7). These institutions are further elaborated on to include river basin management institutions that would be composed of various government officials from different ministries. Therefore, logically speaking, the Goal Attainment increase observed here can be accredited to global IWRM adoption.

7.4 Goal Attainment vs. NBI Influence

Three possible alternative explanations aside from the NBI have been given to explain the increase in indicators present in the Post-NBI water policies of the ENB. Each of the alternative scenarios discussed above has been proven to be a plausible explanation for the increase in Goal Attainment in the national water policies of the ENB. The final sub-question has thus been answered; yes, alternative explanations do exist that can be identified in explaining the perceived relations between the NBI and the Post-NBI water policies of the ENB states. As discussed previously, in order to establish that it was indeed the NBI that has caused the increase in Goal Attainment of each country, alternative explanations for the increase would have to be dismissed. However, the alternative explanations identified cannot be dismissed and therefore the NBI cannot be given credit for influencing the current water policy contents of Ethiopia, Sudan or Egypt.

A second finding of this research claims that if the NBI was the reasoning behind the increase in Goal Attainment, greater cooperation between the riparians on all aspects would have comprised a larger portion of each water policy. The two NBI Policy Guidelines that deal most with cooperation and integration, numbers 3 and 4, are the Objectives with the lowest scores for all three countries. While Ethiopia scored much better than Egypt or Sudan in these categories, they are Ethiopia’s lowest scores. Objective 3 is the NBI Policy Objective that concerns direct cooperation between the riparian states stating, *To ensure cooperation and joint action between the riparian countries, seeking win-win gains*. A greater increase, or presence at all in Sudan’s case, would have been seen if the NBI has truly had an influence on the national water policy content of the ENB. Taking a look back at Figure 13, Objectives 3 and 4 were given the lowest scores in the Pre- and Post-NBI water policy assessments. Objective 4 which states, *To target poverty eradication and promote economic integration*, also focuses on collaboration between the riparians through indicators that measure the establishment of preferred trading mechanisms. The pattern in the results clearly shows a lack

of formal, pre-meditated cooperation between Egypt, Sudan and Ethiopia and thus the increase in Goal Attainment cannot be attributed to the NBI.

7.5 Why the Lack of NBI Influence on National Water Policy in the ENB States?

It has been shown that the presence or absence of each indicator has not been a result of the NBI, but rather a combination of underlying factors. This section briefly explores why the NBI has had little to no influence upon the current water policies of the ENB. Many reasons and opinions abound as to why the NBI has lacked legal influence. Unilateral thinking fueled by centuries of mistrust, the overreaching hegemonic power of Egypt, a disproportionately developed professional and technical capacity for water resources management among the riparian states, and internal civil strife are a few of these reasons that are discussed here.

The first reason is the persistence of unilateral thinking fueled by mistrust that is taking precedence over basin-wide development. This mentality has continued to hinder cooperation between the ENB states. According to Campbell (2007), the effectiveness of international organizations depends on the level that the member governments are “committed to cooperation through the organization, the extent to which individual states are prepared to think basin-wide, and the political levels at which the organization is connected to the member countries”. He then takes it a step further by stating that the success also depends on the “preparedness of states to sacrifice some of their own interests to accommodate those of their neighbors” (578-580). This in no way describes the attitude of Egypt or Sudan, who are adamant on retaining their 55.5 and 18.5 BCM of water as allocated per the 1959 Agreement. Dr. Fahmy summarized Egypt’s view of this issue in stating that, “We have a good understanding for their [Ethiopia’s] needs, however, unfortunately, they don’t have such an understanding for our [Egypt’s] fears” (personal communication, 2 May 2010). Egypt views giving up any of the 55.5 BCM as a death sentence and therefore the allocation is a non-negotiable. However, Ethiopia continues to focus on the redistribution of water among the riparians, claiming its natural rights to the waters that originate within its borders. Makonnen Loulseged, head of the design Department of the Ethiopian Ministry of Water Resources sums up Ethiopia’s position by exclaiming that “until the agreement of 1959 is null and void, cooperation will be unsustainable” (as quoted from 2002 in Foulds, 2006: 81). This lack of cooperation is reflected in the national water policies.

Egypt’s continual wielding of its hegemonic power over the other basin riparians has also hampered the NBI from having more influence on a national level. Campbell (2007: 580) muses that “National bureaucrats have the ability to slow down or even block the activities of the organization, and there are always a myriad of excuses which can be invoked. Lack of capacity, lack of support from the central secretariat and problems with contracts are all commonly used to explain failure to cooperate while still professing a desire to cooperate”. Christine Anderson, law professor at AUC went so far as to say that Egypt has used the NBI to prevent progress (personal communication, 4 May 2010). One method that Egypt accomplishes this is through the general proceedings of the World Bank (WB). The WB’s Operational Policy 7.5 works in a manner such that funding for a project will not be granted unless every riparian in the basin gives their approval. It is not known how many projects that Ethiopia has requested funds for from the WB, but it’s near certain that Egypt has approved very few, if any, that deal with water resources development. According to Seifulazis Milas, a Research Consultant for InterAfrica Group, the WB Operational Policy “operates as a veto for the Egyptian government concerning downstream water resource development. The OP7.5 is at the heart of the NBI, and its preservation will function as an instrument of failure in the NBI agenda” (as quoted from 2001 in Foulds, 2006: 85). Yacob Arsano, Professor of Political Science at Addis Ababa University says this puts Ethiopia in a tough position and they “will

accept whatever the World Bank says because they depend on World Bank funding” in other areas (as quoted from 2002 in Foulds, 2006: 85). Thus Egypt uses the WB’s policies to its own advantage.

Part of the reason as to why the NBI has not made a difference to Egyptian water policy is that they are so far ahead of Sudan and Ethiopia capacity wise in just about every way imaginable (Waterbury, 2002). Egypt then uses this expertise to assist Sudan and Ethiopia in projects that are unrelated to the allocation issue at hand as a delay mechanism. Waterbury (2002) believes that Egypt is interested in cooperation with the other riparians, but only in developing alternatives to Nile water. Erlich (2002: 218) confers with this strategy claiming, “Egypt, concerned with its strategy of ‘water security’ is full of goodwill regarding general cooperation and regional development, and in this sense, is very much interested in projects such as ecological conservation, reforestation of the Ethiopian highlands, and other cooperative enterprises aimed at securing more waters. The Ethiopian position, on the other hand, is to accept the principle of regional cooperation, but to focus mainly on what they think Egypt wants to ignore: the redistribution of water”.

This view was substantiated by Dr. Fahmy of the National Water Research Centre in Cairo when he emphasized that Ethiopia does have the right to develop, but that there are other projects they can focus on besides large irrigation dams. He stated that Ethiopia should focus on more effective watershed management as well as the production of small dams for power generation. He also believes that more efficient irrigation practices are needed in Sudan; by introducing drainage in Sudan, they will not need to irrigate so much (personal communication, 2 May 2010). These actions, while beneficial to Ethiopia and Sudan, detract attention from the Nile water allocation issue and further bolster Egypt’s strong position in the international community.

Lastly, internal problems within the countries themselves have hindered the NBI and its influence on national water policy. Campbell (2007) identifies three difficulties that usually exist in developing country transboundary river basins that can make the management of these rivers more difficult than ones that lie within developed nations: lack of capacity and resources, need for development in the name of poverty alleviation and a lack of inclusivity in governance. Indeed, in July of 2002, the Ethiopian government concluded that the three main constraints that have kept Ethiopia from properly utilizing their water resources are, lack of knowledge, lack of finances, and lack of organizational capacity (Arsano & Tamrat, 2005). The extreme poverty, civil strife, and lack of capacity in Sudan and Ethiopia, and to a lesser degree in Egypt hinder sustainable development in all areas of policy making; river basin management is no different. The NBI and the national water policies will most likely not receive the proper attention until these more pressing issues are dealt with and improved.

7.6 Conclusion

This chapter began with the goal of establishing NBI causality for the witnessed increase in Goal Attainment by Ethiopia, Sudan and Egypt. The final sub-question was posed which asked if there were any underlying explanations that could account for the observed Goal Attainment increases. Three alternative explanations were proposed and justified: global IWRM adoption, environmental urgencies, and population growth. Each of the twelve policy contents indicators that contained a Goal Attainment increase by one or more countries were discussed in relation to one or more of the alternative explanations. It was determined that for every indicator, one or more of the alternative explanations provided a plausible reason for the increase, diminishing NBI influence in the process. Since none of the alternative explanations could be dismissed, the NBI was granted as having had negligible influence on the current, Post-NBI national water policies of the ENB states.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Introduction

The final chapter of this research will now synthesize the results obtained from the four sub-questions that were posed throughout the report, leading to the discussion of the main research question. The main research question will indeed be answered followed by a dissection of the general research bias' and limitations that were experienced throughout the nine months allocated for this project. Next, areas for further research will be elaborated upon. The report concludes with final recommendations for the NBI and its impact on the national water policies of the ENB riparian states.

8.2 The Influence of the NBI

This research began with creating an assessment framework as a means of gauging whether the NBI has influenced the content of the national water policies of the ENB. A distinction was made between simple Goal Attainment, meaning the water policies contained the policy contents indicators, and NBI Influence which provides the NBI as the reason behind the presence of the said policy contents indicators. The aim of this research was thus to answer the following research question:

To what extent have the national water policies of the Eastern Nile Basin been influenced by the objectives of the Nile Basin Initiative?

The case has been proven here that the NBI has not played a definitive hand in forming the contents of the current, Post-NBI national water policies of the ENB states. Therefore the answer to the main research question falls along the lines of 'little to no influence'. Reasons have been given in an attempt to explain why which include the unwillingness of the riparians to cooperate on a legal plane, Egyptian hegemony and its implications, the impacts of WB policy and the lack of professional and technical capacity. Each riparian does show Goal Attainment in meeting more of the NBI Policy Guidelines in their current water policies, but alas it is not due to the commitments they have made within the NBI. Rather, it is seemingly due to a natural progression of global water policy in adopting an IWRM approach, taken from international law combined with the growing pressures of population growth and environmental degradation. While all transboundary river basins have elements in common, each has a unique hydro-political and demographic dynamic that makes generalizing the value of informal political agreements near impossible. Therefore, the value of these agreements is context specific. The results of this case study beg a further discussion of the value of informal political commitments in transboundary river basins. It is believed that these types of commitments will be more fruitful if the individual riparian water policies are unified in the desire and obligation for cooperative management.

However, according to Dr. Rick Tutwiler, the Director of the Desert Development Center in New Cairo, "the NBI has made a change diplomatically, [it has] changed Egypt's views of its neighbors" (personal communication, 6 May 2010). Saleh (2008) agrees with this attitude and believes that "in spite of the lack of tangible development forged under the NBI, with a legal regime it could provide a suitable framework and forum for basin-wide developmental consultations and a forum for effective basin-wide decision-making at some point in the future" (36). Only time will tell. While there has been advancement on the Nile, it

is in terms of an integrated approach to river management by each riparian nation, not an advancement in ENB-wide cooperation for sustainable utilization of the Nile River.

8.3 Research Bias and Limitations

It is safe to assume that all research has some level of bias and subjectivity and this research is no different. Particularly in the construction of the assessment framework, while the indicators were chosen based on their presence in IWRM literature, there is a large level of selection bias since only 20 indicators were chosen out of hundreds of possibilities. The list is acknowledged to be by no means exhaustive. Indicators were limited to 20 due to time restrictions as well as the desire to keep the scale of the research more focused on an overall picture of the situation and not an extremely detailed account, or in other words, breadth over depth.

While previously discussed, it is important to revisit the data availability issues that were encountered, particularly in obtaining original water policy documents. The results pertaining to Goal Attainment for the individual countries may have been completely different had the original Pre-NBI water policy documents of Ethiopia and Sudan been made available. While the next best information was used, the difference in outcome is acknowledged here as a strong possibility. The limitations of the results of the research are that they are highly specific to the Eastern Nile Basin and difficult to generalize. Therefore the results may not be useful when researching other transboundary river management arrangements in developing countries. Due to the currently unfolding state of affairs regarding Nile basin development and the NBI, the results of this research may not be valid for a long period of time. As will be discussed in the next section, the situation of the Nile River basin regime is constantly changing. Despite these setbacks and limitations, it is believed that an accurate representation of the current situation in the ENB is given in this report.

8.4 Opportunities for Further Research

The situation with the NBI and the ENB is current and continuously unfolding and therefore many opportunities and necessities abound for further research. The most recent developments in the CFA ratification process are now described in brief. In April of 2010 the hope of the nine member countries of the NBI to agree on the CFA once again reached a stalemate. During an Extraordinary Nile Council of Ministers meeting on April 13th, held in Sharm El-Shiekh, Egypt, the same seven riparians of Rwanda, Kenya, DR Congo, Tanzania, Uganda, Burundi and Ethiopia agreed to “open the CFA [for signature] from the 14th of May, 2010 and it shall remain open for not more than one year (NBI, 2010). Egypt and Sudan staunchly disagreed. Egyptian Minister of Water Resources and Irrigation Mohammed Nasreddin Allam insists that Egypt would maintain its rightful share, 55.5 BCM of the river flow (Nasrawi, 2010). Egypt also wants to retain veto power over any new irrigation projects undertaken by any of the other riparian nations. On May 14, 2010 the CFA was indeed signed by Rwanda, Ethiopia, Uganda and Tanzania. A few weeks later Kenya signed the CFA. Burundi and the DR Congo are also expected to sign in the near future. Ethiopia’s Minister of Water Resources stated, “This agreement benefits all of us and harms none of us” to which the Egyptian Foreign Affairs Minister Ahmed Abul Gheit warned that Egypt’s 55.5 BCM allocation of water was a “red line” and then threatened legal action if necessary (Ashine, 2010). Minister Gheit further stated that “Any unilateral agreement signed by the upstream Nile Basin countries is not binding on downstream countries, Egypt and Sudan, and lacks legitimacy” (Ashine, 2010).

At press time of this research, the situation has not made any progress, but new developments in the struggle for CFA signature and ratification will continue. The CFA has still not been signed by Egypt or Sudan. Both countries have dismissed the treaty and have

publically acknowledged that neither of them plans to ever sign it as it is currently written. The latest development is the recent approval (June 27, 2010) of Dr. Wael M. Khairy of Egypt as the Executive Director of the NBI Secretariat. Dr. Khairy has an engineering background and currently serves as the National NBI Office of Egypt. Surely, the outcomes resulting from Egypt having a powerful position within the NBI will be of consequence. It will be interesting to watch how the NBI proceeds as an international organization under Egypt's leadership. Areas for research on this topic include, Will the NBI last? How long will Sudan and to a larger extent Egypt, hold out on water redistribution talks? To what extent will the international community become involved if the stalemate continues? What would be the impacts if the international community were to intercede? An opportunity may arise for very interesting research if the CFA or an equally binding agreement is finally signed and ratified between the riparians. Conducting identical research on the national water policies that are written after the CFA has come into effect and then comparing them to the current national water policies that were the focus of this research would give more concrete insight to the value of informal and formal water management agreements.

Another critical issue that deserves further discovery is the potential secession of Southern Sudan in 2011. The referendum is approaching and if Southern Sudan does vote to become an independent nation, the current policies of Sudan, as well as Egypt and Ethiopia will most likely have to be redrawn. The water allocation of 55.5 BCM to Egypt and 18.5 BCM to Sudan will certainly not be valid anymore with the addition of a third riparian. A newly formed Southern Sudan will also be in control of the Jonglei Canal. If the new government decides to complete the project additional water will be added to the total Nile flow which will certainly require the alteration of the national water policies of the now four riparian ENB. Will the national water policies of Egypt, Sudan and Ethiopia be affected by the creation of Southern Sudan? In what way will the new situation affect the current effort to achieve basin-wide cooperation on the Nile waters? Will the ENB become more conflictual or more cooperative towards a legal regime? Will Southern Sudan become a member of the NBI and if so will the NBI influence its national water policy? Will the NBI last? Some of these questions are timelier than others, but depending on the near future, will all deserve looking into.

8.5 Recommendations for Improving NBI Influence on National Water Policies

The results from this research indicate that the NBI is most likely not an influential force upon the contents of the national water policies of the ENB until a legal management framework can be agreed upon. The CFA needs to be negotiated and signed by *all* the riparians, in order for the NBI to make the impact that it was meant to. The riparians seem to hold a perception of the NBI that while it is a positive step in a necessary direction, it is a weak organization that does not have the teeth to influence real change, let alone national level policy. Without an agreed upon legal framework (CFA), the contentious area of Nile water allocation will continue. "In the absence of a multilateral agreement ratified by all riparians and a clear legal status the NBI appears to have little space to maneuver its efforts to prevent the Nile riparians proceeding with unilateral projects and has only limited capacity to influence national water policies" (Cascão, 2009: 263). Therefore, in order for the NBI to have a cooperative influence on the national water policies of the ENB, it is recommended that a legally binding framework be signed by all riparians. However, it is the author's opinion that the current CFA be dramatically altered, for the current CFA under negotiations holds little hope of ever being signed by all riparian nations. In order for cooperation to be sustainable, or even possible, Egypt and Sudan are going to have to rescind the validity of the 1929 and 1959 Agreements and start anew.

A reservoir should be built in Ethiopia to replace the superfluous and inefficient Lake Nasser. Approximately one-quarter of all the water held in Lake Nasser is lost to evaporation and seepage due to its massive surface area of 298 miles long by 10 miles wide (Said, 1993). Erlich (2002) also concludes that in hindsight it was perhaps not Egypt's best move, "The Aswan High Dam was no final solution. It was a partial, one-sided Arab-Egyptian solution to a comprehensive all-basin issue...it is the wrong dam in the wrong place. Its price is today's Egyptian anxieties" (5). The reservoir in Ethiopia would reside in the highlands, be deeper with a smaller surface area to limit evaporation. This reservoir could store the Blue Nile waters and be released for irrigation water for Sudan. Aaron Tesfaye (2008: 62) agrees, "This has the additional advantage of reducing flooding and siltation in dams, which make the dams expensive for Sudan to maintain". Moving the ENB reservoir to Ethiopia would no doubt make Egypt nervous; the major appeal of Lake Nasser is that it is within Egypt's borders. However, a substantial amount of water would be saved. If Egypt were to be granted the same amount of Nile water as before (55.5 BCM) under this new agreement, the extra water savings from the new reservoir could be utilized by Ethiopia and Sudan. Trust will have to improve between the riparians before an agreement this radically different from the status quo to be created and implemented. Ideally, this new arrangement would increase the Nile water supply, which in theory would create greater flexibility for a new allocation treaty to be drawn up by the riparians, leading to a less contentious and competitive discourse regarding cooperation. The new mutually beneficial development of the Nile River would then show greater promise of being reflected in each of the riparian's national water policies.

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 Downtown Cairo, Egypt, from author's personal collection

APPENDIX 1

Table 9: NBI Policy Objectives and Indicators with Citations

	NBI Policy Objectives	Policy Contents Indicators
1	To develop the water resources of the Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.	<p>Opportunities for affected stakeholder group involvement (Uitto & Duda, 2002; Marty, 2001; Wolf, 1997; Durth, 1996; Jaspers, 2003; Giordano & Wolf, 2003; Ashton, 2002)</p> <p>Special consideration given to women and young persons for participation (UN MDG)</p> <p>Water needs of future generations are kept in mind (Def)</p> <p>Water allocated toward ecosystem maintenance (Gleick, 1998)</p> <p>Benefit-sharing mechanism, allows physical benefits to be separated from economic benefits, Sadoff & Grey, 2005; Howe, 1996); Benefits shared equally (Wolf, 1999: 12), technological advances as a benefit (Prakash & Hart, 2000: 108)</p>
2	To ensure efficient water management and the optimal use of the resources.	<p>Flexible policies with adaptive capacities for changing circumstances (Grey & Sadoff, 2007; Uitto & Duda, 2002; Marty, 2001; Wolf, 1997; Gleick, 1993; Giordano & Wolf, 2003)</p> <p>Seasonal allocations (Kliot)</p> <p>Pledge to make use of best available technologies on both supply and demand sides (Gleick, 1998)</p> <p>Varying water quality standards for varying uses, can lead to economic savings (Gleick, 1998)</p> <p>Investment in infrastructure that control and deliver water resources (Grey & Sadoff, 2007: 565, 567)</p>
3	To ensure cooperation and joint action between the riparian countries, seeking win-win gains.	<p>Promote joint fact-finding with reps from each riparian (Uitto & Duda, 2002; Wolf, 1997; Wolf, 1998; Gleick, 1993; Giordano & Wolf, 2003; Wolf, 1999: 13)</p> <p>Information sharing is encouraged and data is widely available and unrestricted (Gleick, 1998; Wolf, 1999: 13; Cordery, 2001:151)</p> <p>Establish conflict resolution mechanisms (Wolf, 1998; Gleick, 1993; Hamner & Wolf, 1998; Jaspers, 2003; Giordano & Wolf, 2003)</p>
4	To target poverty eradication and promote economic integration.	<p>Initiatives present to reduce proportion of population that lives below US\$1 per day (UN MDG)</p> <p>Initiatives present to increase employment, especially among women and young people (UN MDG)</p> <p>Recognized preferred trading area within the ENB along Nile? (Prakash & Hart, 2000)</p> <p>Plan for customs tariffs decrease or abolishment, maybe specify in terms of trade along Nile (Prakash & Hart, 2000)</p>
5	To ensure that the program results in a move from planning to action.	<p>Create country-specific, inter-ministerial committees for coordination and implementation (Grey & Sadoff, 2007: 569; Uitto & Duda, 2002; Durth, 1996; Marty, 1997; Bernauer, 2002)</p> <p>Establish a monitoring and evaluation plan (Uitto & Duda, 2002; Bernauer, 2002; Jaspers, 2003: Giordano & Wolf, 2003)</p> <p>Plan of funding in place, whether it be investment, either foreign and/or domestic, FDI</p>

