Grand Ethiopian Renaissance Dam: A Way to Ethnic Conflicts in the Nile River Basin? A Framework for Ethnic Conflicts Settlement

A Master's Thesis submitted for the degree of
"Master of Science"

supervised by
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Vienna, 28.05.2014

Affidavit

I, **BLAIN FELIZITAS VALENTIN**, hereby declare

1. that I am the sole author of the present Master's Thesis, "GRAND ETHIOPIAN RENAISSANCE DAM: A WAY TO ETHNIC CONFLICTS IN THE NILE RIVER BASIN? A FRAMEWORK FOR ETHNIC CONFLICTS SETTLEMENT", 64 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
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ABSTRACT

In the past few years, the Nile River Basin has been subject to a rapid increase in the implementation of new water projects as the Nile riparian States seek to improve their respective national economies, promote development and alleviate poverty. Indeed, Ethiopia has recently started the construction of the Grand Ethiopian Renaissance Dam on the Blue Nile. However, the population of the Basin is threatened by the impacts resulting from the future dam and reservoir. Furthermore, the Basin population is characterized by high ethnic diversity. Therefore, the influence of the Grand Ethiopian Renaissance Dam might induce potential ethnic conflicts among the different groups living in the Nile River Basin. The following research proposes a framework for ethnic conflicts settlement as a means to deal with the potential disputes. The framework is composed of a series of recommendations that need to be implemented as to avoid conflicts in the Basin.

Keywords: Grand Ethiopian Renaissance Dam, Nile River Basin, Ethnic conflicts Settlement Mechanisms

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List of Abbreviations and Acronyms

AMCEN	African Ministerial Conference on the Environment
AMCOW	African Ministerial Council On Water
ANBO	African Network of Basin Organizations
AU	African Union
CFA	Cooperative Framework Agreement
DRC	Democratic Republic of Congo
EAC	East African Community
EEPCo	Ethiopian Electric Power Corporation
ESIA	Environmental and Social Impact Assessment
GERD	Grand Ethiopian Renaissance Dam
GHG	Green House Gases
IGAD	Inter Governmental Authority on Development
IHA	International Hydropower Association
IPoE	International Panel of Experts
Nile-COM	Nile Council of Ministers of water resources
Nile-TAC	Nile Technical Advisory Committee
Nile-SEC	Nile Basin Initiative Secretariat
NRB	Nile River Basin
NRI	Nile River Initiative
NWA	Nile water Agreement
SVP	Shared Vision Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational Scientific and Cultural Organization
UNDP	United Nations Development Program
WB	World Bank
WCD	World Commission on Dams

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CHAPTER 1: INTRODUCTION

The total amount of freshwater available on the Earth's surface is only 3 % from which only 0.3 % represents freshwater located in rivers and lakes. (Tadesse, 2008: 1) Furthermore, as the world's population grows and the demand for freshwater increases, the uneven distribution around the Globe becomes a potential risk of disputes and conflicts. To avoid the possibility of conflicts, freshwater needs to be treated in a way that everyone obtains a fair share.

The Nile River Basin is one of the largest basins on Earth, and stretches from central Africa up to North-East Africa. The Nile River and its tributaries flow through ten different countries making the share and management of its waters extremely complex. Nevertheless, many of the riparian States hope to lift their countries' economies and wealth fare through the development of hydropower. It is well known that the quantity of water flowing through the Nile River Basin represents a very high and promising potential for hydropower use in many Nile riparian States. (IHA, 2013)

However, the riparian countries should not put aside the implications followed by the presence of hydropower stations, especially regarding their population and the impacts on the environment. As a matter of fact, studies show that the quality of the Nile waters is deteriorating due to the *"intensification of agricultural activities, industrial development and accelerating soil erosion"* (Nile Basin Initiative, 2012: 226; IHA, 2003). A recent issue that threats the Nile River Basin is the rapid construction of dams for hydropower and irrigation purposes. In fact, the development of dams induces issues such as silt sedimentation of rivers, land degradation of watersheds, and eutrophication of the Equatorial Lakes. (Nile Basin Initiative, 2012; IHA, 2003)

Equally important, the populations living by the river banks and upstream from the hydropower stations are forced to move from the area as the water level rises after completion of the dams construction, thus, creating manmade reservoirs. The phenomenon of people displacement is observed in most of the areas where large dams are built. However, the effect on displaced population can vary according

to the condition of the resettlement sites, the amount of people displaced or the relationship between host and guest populations.

Another effect that arises due to the construction of large hydropower dams in the Nile River Basin is water based conflicts between different ethnic groups. This effect is possibly linked closely to the phenomenon of people displacement just mentioned before. Indeed, the Nile River Basin is home to 160 million people (Pottinger, 2004: 1) which account numerous different ethnic groups. The hostile tensions arise not only between ethnic groups of a same country but might also arise between groups of two neighboring countries. Several of the impacts indicated previously are observable in the case of the new project that is the 6000 MW Grand Ethiopian Renaissance Dam (GERD). The completion of this project will put Ethiopia in a difficult position vis à vis the other riparian States, especially Egypt and Sudan. As soon as the construction phase of this project comes to an end, Ethiopia will have ultimate control over the Blue Nile River, leaving Sudan and Egypt with a lowered supply from that source.

1.1. Major Aspects of the Thesis

The first aspect of this master thesis is, to define the possible consequences that will appear due to the construction of the GERD on the population of the Nile River Basin. To do so, the research will examine similar situations that occurred near other hydropower stations in the region. It is the close relation between environmental and human disturbance that will be focused on in this master thesis. That is, to fully understand the nature of the possible water conflicts in the region, the research will be presenting the political implication of the riparian States and will analyze the political achievements reached so far. Furthermore, the research will focus on the impacts resulting from hydropower stations on the environment, as well as on the population of the Nile River Basin and how this contributes to ethnic conflicts.

Is the construction of the new GERD in Ethiopia going to be the trigger of ethnic conflicts in the area? Are the concerned indigenous groups in Ethiopia going to relive the same dramatic situation as the Nubians did in Egypt after the construction of the Aswan High Dam? Will the situation between ethnic groups

living at the borders of Ethiopia escalate as it has between tribes from the Omo River at the border between Ethiopia and Kenya?

The second aspect of this master thesis is to propose mechanisms that are adapted and could be applied on international waterbodies for settling potential conflicts on water resources in the Nile River Basin. Indeed, the competition over the control of the Nile River has always existed between the riparian States, in particular between Egypt, Ethiopia and Sudan. Therefore, proposing mitigation and implementation measures will not be the easiest of tasks. Until then, a real effort regarding cooperation has to be done by all of the riparian States without exceptions. Thus, more agreements like the Nile Basin Cooperative Framework Agreement need to be settled, however, with a stronger focus on the population of the Nile River Basin.

1.2. Methodology

In order to answer to the previous questions and reach the aspects of this thesis, a thorough literature research will be carried out and presented throughout the work. The sources used in this thesis are both primary and secondary sources. The answers to the research questions help structure the thesis in three separate chapters, starting with the presentation of the GERD project and the potential impacts on the population. The next chapter will deal with the political situation of the Nile River Basin, and finally the last chapter will propose a framework for ethnic conflicts settlement.

CHAPTER 2: THE GRAND ETHIOPIAN RENAISSANCE DAM IN THE NILE RIVER BASIN

2.1. Background History on the Nile River Basin

The Nile River Basin (NRB), as shown on Figure 1, is one of the largest basins on Earth, and stretches from central Africa up to North-East Africa. The Nile River is considered to be one of the longest rivers on Earth, with a length of 6,875 Km (Arsano, 2007: 25). The Nile River and its tributaries flow through eleven different African countries defined as the riparian states. These riparian States are separated in two groups, the upstream States, on the one hand, and the downstream States, on the other hand. The upstream states are Burundi, Democratic Republic of Congo (DRC), Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The downstream States are Egypt, The Sudan and South Sudan[1].

The Nile River has two main sources. The most important source is called the Blue Nile and initiates at Lake Tana in North-West Ethiopia. The second source is called the White Nile and initiates from the Equatorial Lakes such as Lake Victoria and Lake Kyoga, for instance. In addition to the Blue and the White Nile, other major tributaries support the Nile River, namely Tekeze (Atbara) River and Baro-Akobo (Sobat) River. Arsano (2001) explains that the tributaries that originate in the Ethiopian Highlands represent 86 % (25) of the total Nile River water, while the ones that originate from the Equatorial Lakes represent 14 % (25) of the total Nile River water. On the map in figure 1 it can be observed that the White Nile, the Blue Nile and the other Nile tributaries unit in Sudan.

[1] For simplification reasons, both States of South Sudan and The Sudan will be referred as Sudan in most parts of the present thesis.

FIGURE 1: THE NILE RIVER BASIN

Source: (The World Bank Group, 2013)

Naturally, the riparian States strive to improve and accelerate progress on water resource development as to benefit as much as possible from an important natural resource that is the Nile River. All of the riparian States are aware of the great hydrological potential of the river and several of them are ready to accomplish the necessary arrangements to thrive from that potential. One of those riparian States is Ethiopia, which strives to become a middle-income economy by 2025. For this purpose the Ethiopian government put a lot of effort to develop its energy sector, in particular through hydropower development. Indeed, Ethiopia is *"cited as having the second highest potential for hydro capacity in Africa with an estimated 30,000 Megawatts (MW)"* (Hathaway, 2008: 6). The NRB has a long history of hydropower development with several existing stations and a great number of new projects (see appendix 3).

2.2. Grand Ethiopian Renaissance Dam Project

The past last years showed an increased rate of hydropower development, espacially in upstream states, as they are claiming for their water rights on the Nile River. One of the most recent projects in the NRB is the construction the GERD in Ethiopia. To this end, the research will mostly focus on the issues that surfaces due to the construction of this new hydropower station as it raises questions about the management of tranboundary waters, the protection of the affected environment and population.

2.2.1. Description of the Location of the GERD Project

The GERD is being constructed by the italian company Salini Impregilo S.p.A in the Regional State of Benishangul-Gumuz, as shown on the map in Figure 2, less than twenty kilometers East from the Sudanese border. The location of the site was first proposed in the end of the 1950s by the U.S Bureau of Reclamation after a survey conducted on the Blue Nile Sub-Basin estimating the potential of generating about 10,000 MW (Veilleux, 2013) through a series of hydropower dams. After that, in 2008, further studies have been conducted as to determine the feasibility of the site under the auspices of the Nile Basin Initiative and the Eastern Nile Power Trade

Studies. In fact, the present site was defined as suitable for hydropower generation purposes and the promotion of interregional trade in power supplies.

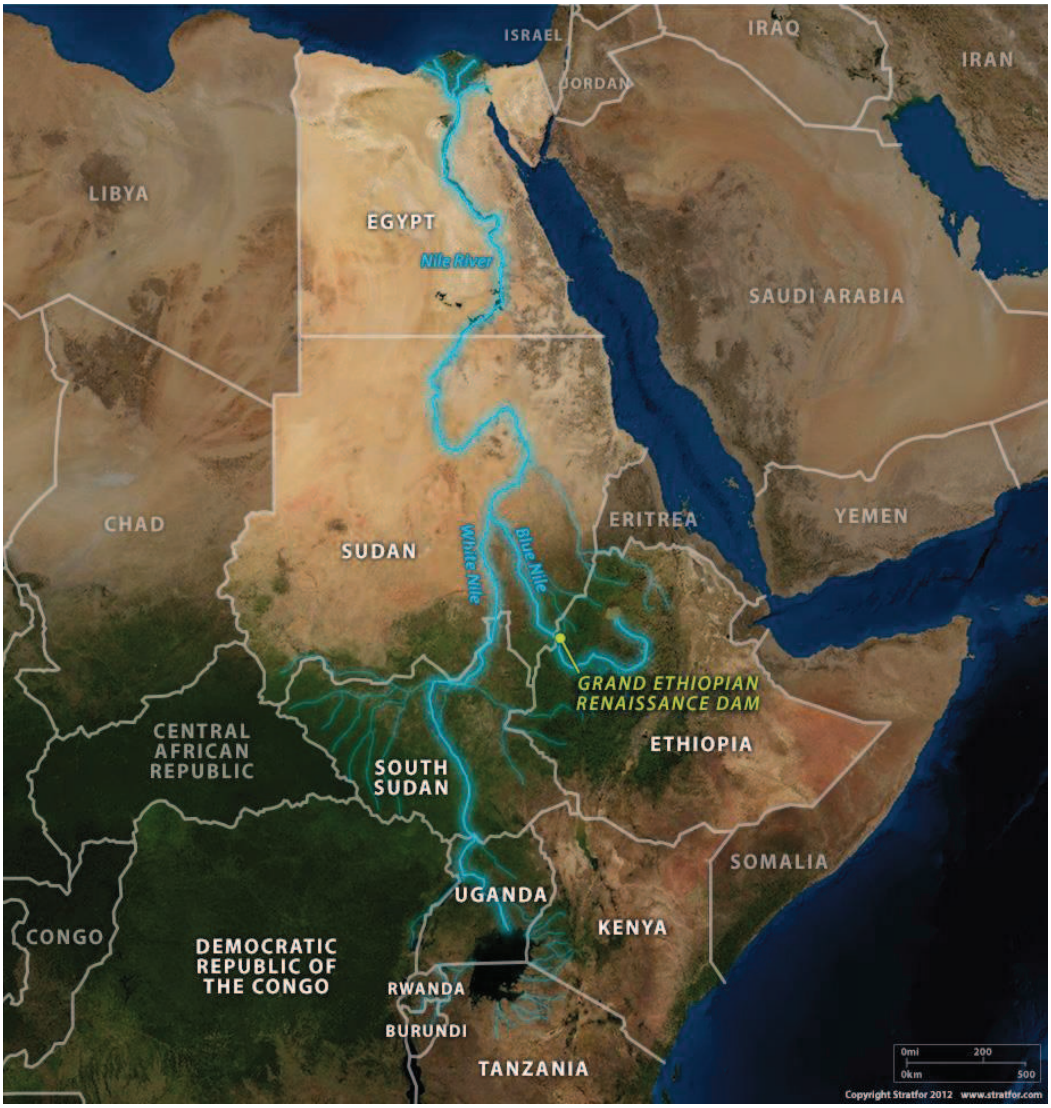

FIGURE 2: LOCATION OF THE GERD IN THE NILE RIVER BASIN

Source: (Stratfor Global Intelligence, 2014)

2.2.1.1. Climate of the Region

The choice of the location of the construction site is understandable as the Blue Nile tributary is one of the most important source of the Basin. In fact, according to International Rivers Network (2012), the highest average annual precipitation over the Blue Nile Sub-Basin was measured at around 1,300 mm (International Rivers Network, 2012: 10) and the lowest was measured at around 800 mm (11) further to the East of the Sub-Basin. Likewise, the average annual

precipitation of the Benishangul-Gumuz Region registered is around 860 mm (10). Note that the *"region's rainfall is unimodal"* (10) and the precipitation is highest during the rain season, meaning from May to October. Furthermore, there is a possible 20 % loss (10) of surface water in the form of runoff.

2.2.1.2. Population of the Region

According to the Central Statistical Agency (2007) of Ethiopia the number of inhabitants in the Benishangul-Gumuz Region is around 784,350.

Furthermore, the Central Statistical Agency list the different ethnic groups in the region. In fact, the most important indigenous ethinic groups are the Berta (25.41 %), Gumuz (20.88 %), Shinasha (7.72 %), Mao (1.96 %), and Komo (0.99 %). Other ethnic groups are the Amhara (21.69 %), Oromo (13.55 %), Agew (4.22 %) and Tigre (0.71 %) which mostly represent groups relocated from the Ethiopian Highlands due to overgrazing, deforestation, and/or past armed conflicts. The ethnic groups living at the GERD project site are mainly the indigenous Gumuz and Berta groups. (International Rivers Network, 2012)

2.2.1.3. Livelihoods in the Region

The main livelihoods of the Benishangul-Gumuz Region are agriculture and traditional farming practices, fisheries, livestock husbandry and artisanal gold mining activity. In fact, the regional economy is mainly dependent on agriculture as it represents 93.2 % of the active population. Further livelihoods encountered in the region are hunting and gathering wild foods, beekeeping, and handcraft.

2.2.2. Description of the GERD Project

Figure 3 shows the construction site of the GERD with the main dam, the saddle dam and the spillway. In red is indicated where the future power houses will be installed and the blue line draws the delineation of the estimated reservoir.

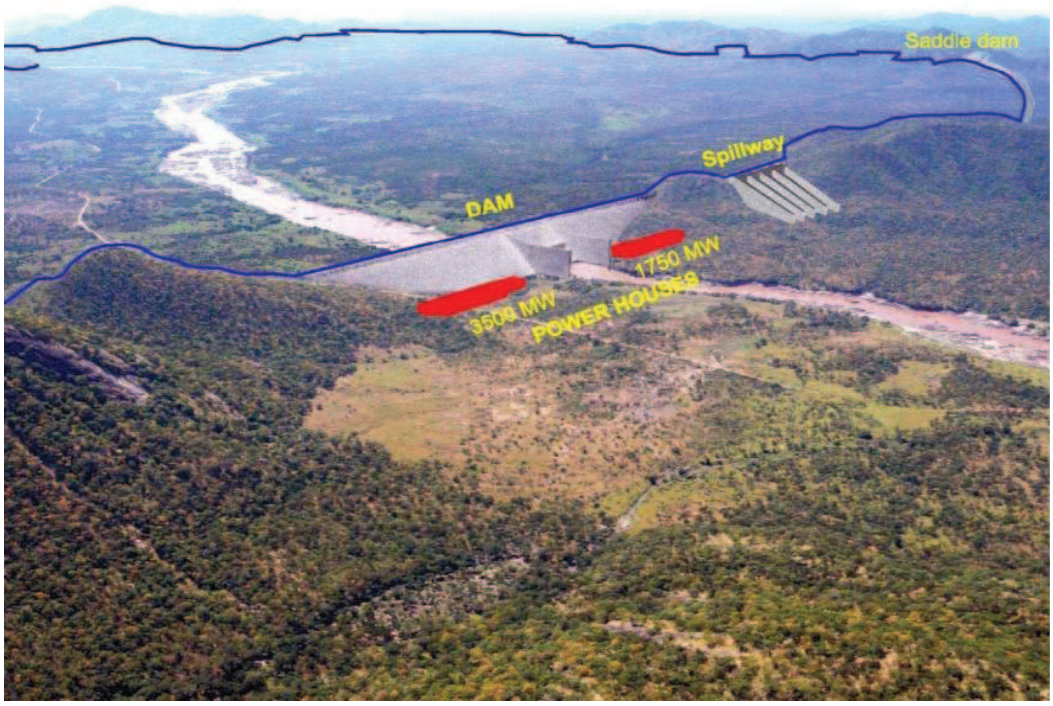

FIGURE 3: AERIAL PHOTOGRAPH OF THE GERD PROJECT AREA

Source: (IPoE, 2013)

The GERD project plans, as shown in Table 1, the construction of a 170 m high and 1,800 m long dam wall in roller compacted concrete providing a body volume of 10 million cubic meters. Besides the main dam, a saddle dam[2] with waterproof asphalt surface is being built on the left bank providing an extra 16 million cubic meters body volume. Both dams are equiped with emergency spillways[3] with no sluices[4]. (Salini Impregilo S.p.A, 2014)

TABLE 1: TECHNICAL DATA OF THE DAM

	Main Dam	Saddle Dam
Maximum Height	170 m	50 m
Crown Length	1,800 m	5,000 m
Crown Height	645 slm[5]	645 slm
Dam Body Volume	10 million m^3	16 million m^3

Source:(Salini Impregilo S.p.A, 2014)

[2] See appendix 1
[3] Ibid.
[4] Ibid.
[5] slm is an abbreviation for standard liter per minute

The dam will block the Blue Nile and will create a 1,800 square kilometers large reservoir with a volume capacity of 63 billion cubic meters. The size of the reservoir is estimated to be twice as wide as the largest natural lake in Ethiopia, namely Lake Tana. It is estimated that the inundation of the area will displace around 12,500 to 20,000 people (Veilleux, 2013).

TABLE 2: EXPECTED DIMENSIONS OF THE RESERVOIR

	Reservoir
Volume	63 billion m^3
Surface Area	1,800 Km^2

Source: (Salini Impregilo S.p.A, 2014)

The reservoir level will be regulated through spillways that are designed to provide for a probable maximum flood of 19,370 cubic meters per second (Consulate General of Ethiopia Los Angeles, n.d.: 6).

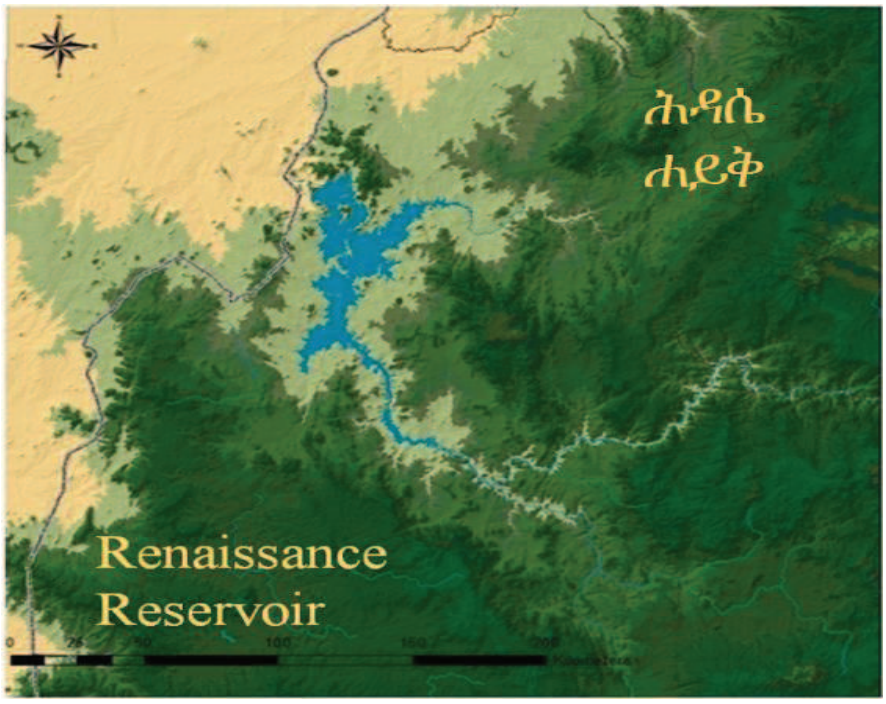

FIGURE 4: MODEL OF THE RESERVOIR AT THE GERD

Source: (IPoE, 2013)

Furthermore, there will be two power stations installed on both sides of the river bank for the production of electricity. The stations will shelter a number of Francis turbines with a capacity of 375 megawatts each bringing the total capacity to 6,000 megawatts and an annual energy production of 15,000 gigawatts hour per year. (Salini Impregilo S.p.A, 2014) In addition, a 500 kilovolts double bus-bar switchyard will be installed at around 1.5 kilometers downstream of the main dam. The swichyard will be composed of incoming bays from transformer feeders at the power station and of outgoing transmission line bays. (Consulate General of Ethiopia Los Angeles, n.d.)

TABLE 3: EXPECTED ENERGY PRODUCTION AT THE POWER STATIONS

	Power Stations	
	Right Bank	Left Bank
Turbine Type	Francis Turbine	Francis Turbine
Capacity of a Turbine	375 MW	375 MW
Number of Turbine	10	6
Total Capacity	6,000 MW	
Annual Energy Production	15,000 GWh/year	

Source: (Salini Impregilo S.p.A, 2014)

Further, the project plans to build a spillway to control the flow of possible floods. The water will be controlled by sluice gates, concrete-coated drainage channel, non-coated dissipation pit and return channel. According to Salini (2014), the flow rate of the constructed spillway will be around 15,000 cubic meters per second and will enable to control possible floods, thus, avoid any flooding. (Salini Impregilo S.p.A, 2014)

TABLE 4: TECHNICAL DATA OF THE SPILLWAY

	Spillway
Design Capacity	15,000 m^3/s
Sluices	6 - 14 x 15.5 m

Source:(Salini Impregilo S.p.A, 2014)

Finally, note that the central section of the main dam will be maintained lower than the right and left bank sections to act as a further spillway and permit rainy season floods. (Consulate General of Ethiopia Los Angeles, n.d.)

2.2.3. Stakeholders and Institutions Involved in the GERD Project

The National Steering Team of the Growth and Transformation Plan together with the Ministry of Water and Energy and several other regulatory bodies are in charge of following the project and guarantee its safe implementation.

The management board and team of the Ethiopian Electric Power Corporation (EEPCo) are directly involved in the construction of the GERD and they follow its implementation regularly. Note that the EEPCo is involved in hydropower and energy sectors and engages in *"electricity generation, transmission and distribution in Ethiopia"*(Hailemaria, 2011: 34).

Furthermore, the EEPCo performed an environmental and social impact assessment on the project. However, presently both reports are unavailable to the public. In addition, a survey on the impacts of the GERD project was conducted by an International Panel of Experts (IPoE). The committee was composed by experts from Egypt, Ethiopia and Sudan. Note that during the research of this thesis, only the report from the IPoE was available. (IPoE, 2013)

2.2.4. Implications Arising from the GERD Project

The Ethiopian Governement is strongly supporting the implementation of the GERD project and is hoping for its completion in 2017. The main objective of this project is the generation of electricity for national as well as international supply. In addition, the anticipitated energy overproduction and exportation is believed to elevate the country's economy and improve its welfare. In fact, EEPCo has already signed contracts for selling electricity to Kenya, Djibouti, South Sudan, and The Sudan (Veilleux, 2013).

However, as for every large hydropower project, there are benefits and costs to take into consideration. Indeed, the GERD is a large-scaled hydropower infrastucture which implies that the influences caused by the installed dam are going to be noticeable both at a local level as well as at a international level.

Hailemaria (2011) argues that hydropower development can represent a favorable substitute to electricity production using fossil fuels, particularly in developing countries. In fact, the world *"contribution of hydroelectric energy production"* (Hailemaria, 2011: 20) today represents 20 % (Sternberg, 2008;

Hailemaria, 2011), hence, *"the amount of fossil fuel burning for electricity is avoided by roughly 20 %"* (Hailemaria, 2011: 20).

Nevertheless, as Sternberg (2008) affirms in his article, hydropower is first of all an *"energy bridge, not a solution to the world's energy needs"* (Sternberg, 2008: 1597). In order to deal with today's energy demand, the production of energy cannot only rely on hydropower but rather needs to be an addition to other renewable energy sources. That is, as Sternberg (2008) mentions, *"eolian and geothermal sources should be drawn into the energy matrix as much as possible"* (1618). In fact, due to climate change and climate variability, Ethiopia cannot be dependent only on hydropower. Even the International Hydropower Association (IHA) states that precipitation and a good river flow is necessary to keep the environmental damages at a low level (IHA, 2003).

2.3. Social Disturbances Due to the GERD Project

To date, the energy sector in Ethiopia is dependent at 85 % on hydropower and this number likely to increase up to 95 % once the several new projects currently under construction are put into service. (Hathaway, 2008) As a result, it is important to be aware of the possible negative impacts affecting the environment as to be able to properly carry out mitigation measures or even avoid them if possible. As pointed out later, in Table 5, many of them are manageable and so need to be closely followed and monitored.

The following points present several examples of dam induced environmental degradation, in particular the once that are likely to manifest at the GERD and thereby affect the population.

The area is mainly going to experience 'severe land use-changes', such as sedimentation or soil erosion, Green House Gases emission, and mostly changes in the natural cycles of flora and fauna due to the filling of the reservoir. (WCD, 2000) Another important element that needs to be considered is the flow of the river. A possible reduction might be observable downstream due to the alteration of the flow resulting from the construction of the main dam.

2.3.1. Impacts Induced by Reservoirs

As mentioned earlier, the area that will be flooded by the reservoir stretches over a wide territory. Thus, the effect and the changes in the biodiversity and the terrestrial ecosystems will be the most evident.

2.3.1.1. Terrestrial Ecosystems and Biodiversity

Dams that are built with the purpose of storing water are likely to lead to the destruction of *"terrestrial plants and forests and displace […] animals"* (WCD, 2000: 75) once the filling of the reservoir begins. In fact, the region of Benishangul-Gumuz represents one of the few natural habitat left available in the country for a great number of species, both fauna as well as flora.(International Rivers Network, 2012)

As mentioned in the description of the project, the reservoir is going to submerge a surface of 1,800 square kilometers of diverse vegetation. The most affected ones are forestland, woodland, and grassland with respectivily 90 %, 40 % and 40 % (International Rivers Network, 2012: 14) present in the expected submerged area.

Furthermore, the water quality of the inundated area is very likely to deteriorate, leading to an evident health risk for the population in case there is consumption of the polluted water. Moreover, largely extended areas of flooding constitute favorable environments for breeding waterborne diseases, hence, threating once more the local population.

2.3.1.2. Sedimentation

The Ethiopian Highlands tend to be one of the most erosion-prone areas known. Consequently, high loads of silt are a particular characteristic of the Nile River, which are transported starting from the Ethiopian Highlands all the way downstream to the Egyptian Delta. It is due to that high load of silt that the Egyptian desert was able to be fertilized after the annual flood.

However, the presence of a dam across a river prevents silt transportation and results in the deposition of the sediments. The process of sedimentation has not only an adverse effect on the performance of the dam but also on the water quality in the reservoir and even further downstream of the hydropower station. (WCD, 2000)

Indeed, the World Commission on Dams (WCD) elaborates that the decrease in particles of sediments transported downstream affects and deteriorates the *"floodplain and coastal delta morphology and causes the loss of aquatic habitat for fish and other species"* (WCD, 2000: 81). In fact, they affirm that:

> **The direct loss of annual silt and nutrient replenishment as a consequence of upstream impoundment is thought to have contributed to the gradual loss of fertility of formerly productive floodplain soils as used in agriculture and flood-recession agriculture (WCD, 2000: 83).**

In other words, the Blue Nile, certainly the most important silt load source of the Basin, will result in aggravating environmental issues upstream in the case of the GERD. Indeed, it can be assumed that agriculture in Egypt, and thereby their food production, will suffer due to the decrease of sediment load. In fact, farmers have observed a lowering of the quality of their crops, long before the GERD project. The lowering of the quality of the crops is related to basin-wide development in general, which renders the situation even more worrisome. A survey from 2012 argues that typically, the Blue Nile transports 95 % of the amount of sediment arriving at the Aswan High Dam. Yet, instead of the sediments being transported upstream, it is anticipated that sedimentation will occur at the GERD.(International Rivers Network, 2012)

Moreover, as already mentioned before, sedimentation deteriorates the performance of the dam. In particular, sedimentation diminishes the water capacity of the dam, thereby shortening its lifetime. Eventually, the International Rivers Network (2012) declares that the deposition rate at the GERD will be around 122.5 million cubic meters yearly (International Rivers Network, 2012: 12) and that after 50 years it will reach around 6 billion cubic meters (12), thus represents a loss of 10 % (12) of storage capacity.

2.3.1.3. Emission of Green House Gases

The emission of GHG by hydropower is minimal in comparison to the amount emitted by other GHG sources. Nevertheless, their emissions were observed,

and therefore are mentioned as an environmental impact. More importantly, the emission is visible at the surface of reservoirs mainly due to the decaying of plants reacting together with carbon inflows and so favoring the production of those GHG. (Bergkamp et al., 2000) Thereby, once the reservoir at the GERD is filled, it is possible that GHG are emitted to the atmosphere.

2.3.1.4. Unproductive Water Evaporation

Indeed, significant losses of water occur due to so called unproductive water evaporation. In fact, unproductive water evaporation are expected at swamps such as in the Sudd, in areas of the White Nile in South Sudan and parts of Uganda, for instance(Bitsue, 2012: 2).

2.3.2. Impacts Induced by Hydropower Dams

It is obvious that damming a river leads to a modification of the stream-flow of that river. Indeed, the dynamism of a river regulates the *"character of aquatic ecosystems"* (WCD, 2000: 78) and is dependent on certain parameters, such as *"natural distribution and timing of stream-flow"* (78) that risk alteration in the presence of hydropower stations and reservoirs.

2.3.2.1. Flow Regimes

As introduced just now, the stream-flow is an important parameter regarding the 'health' of a river. In addition, the load of sediments transported in rivers is a parameter of the stream-flow, thus influencing the quality of the water and the wellbeing of its aquatic ecosystems. Indeed, the WCD (2000) argues that:

> **Natural rivers and their habitats and species are function of the flow, the quantity and character of the sediment in motion through the channel, and the character or composition of the materials that make up the bed and banks of the channel (WCD, 2000: 78).**

Equally important, several studies have shown that the construction of dams have reduced considerably the total amount of water in the Nile River. As described

by the WCD (2000), not only the quantity of sediments is a function of the river, but so is the quantity of the waters.

In fact, a case study conducted in the early 1980s, mentions that a clear reduction of the annual discharge of the Nile River was observed over a period of 30 years (El Moghraby, 1982: 31). Moreover, El Moghraby (1982) argues that overall, the precipitation over the Ethiopian Highlands risk a 15 % (31) reduction meaning 30 % (31) less available discharge for the rest of Ethiopian tributaries.

Another survey argues that in the end of the 19th century, the total amount of water flowing through the Nile River was estimated at around 84 billion cubic meters (Swain, 2008: 202). Thereafter, a reduction of the amount of Nile waters has been observed due to different reasons. Specifically, the construction of the Aswan High Dam in the 1960s, extreme evapotranspiration on the White Nile mainly in the Sudd swamp (South Sudan), or even climate change. (Bitsue, 2012)

2.3.2.2. Migration of Aquatic Organisms

The natural habitat of aquatic organisms and their distribution in the rivers will be modified by the GERD. In fact, the dam will interfere with the migration patterns of aquatic organisms as it will be acting as a physical barrier. (WCD, 2000) It is important to note that migration is a critical part of the life cycle for migratory fish, just as *"reproduction, production of juveniles, growth, and sexual maturation"* (WCD, 2000: 82).

To a further extent, the disturbance of migration patterns risk to affect fisheries and eventually the population dependent on fish in their livelihood.

2.3.2.3. Other Influences on the Environment

Considering the effects of fossil fuel on the environment and comparing to other renewable energies, hydropower is one of the alternatives leading to less aggravating impacts. Indeed, hydropower emits very little NO_x, SO_x particles, or VOC and CO_2 (IHA, 2003: 73) in comparison to other renewable energies. Therefore, the pollution of the atmosphere is contained at a minimum and this could represent a good alternative for replacing the use of coal and gas.

In addition, according to the IHA (2003), negative impacts can be efficiently avoided or mitigated in case the problems are acknowledged right from the start and

are included *"into the planning and operation of large dams"* (72). Equally important, is to carefully select the appropriate site for a new hydropower project.

Furthermore, the IHA (2003) points out that a reservoir that has reach a *"state of stability"* (IHA, 2003: 72) can be compared to a natural lake and can provide a source of water in arid areas for different species, such as migrating birds, for instance.

In the case of the GERD, the most important influence of the construction will be the avoidance of using non-renewable fuel resources, and therefore, lower the production of atmospheric pollutants produced by the usage of coal and gas.

The following table points out several more advantages and disadvantages that hydropower contributes to the environment.

TABLE 5: THE INFLUENCE OF HYDROPOWER ON THE ENVIRONMENT

Environmental Aspects	
Advantages	Disadvantages
✓ Produces no atmospheric pollutants and only very few GHG emissions	- Inundation of terrestrial habitat
✓ Enhances air quality	- Modification of hydrological regimes
✓ Produces no waste	- Modification of aquatic habitats
✓ Avoids depleting non-renewable fuel resources (i.e. coal, gas, oil)	- Water quality needs to be monitored/managed
✓ Often creates new freshwater ecosystems with increased productivity	- Temporary introduction of methyl-mercury into the flood chain needs to be monitored/managed
✓ Enhances knowledge and improves management of valued species due to study results	- Species activities and populations need to be monitored/managed
✓ Helps to slow down climate change	- Barriers for fish migration, fish entrainment
✓ Neither consumes nor pollutes the water it uses for electricity generation purposes	- Sediment composition and transport may need to be monitored/managed

Source: (IHA, 2003: 14)

2.3.3. Socio-Economic Impacts

At present, the demand for energy has considerably increased in comparison to 50 years ago. Accordingly, different sources providing energy are developed and expanded as to cope with urbanization and population growth. One of those energy sources is hydropower. Evidently, the rate of hydropower development, and thereby the rate of construction of dams and their worldwide diffusion have accelarated. (Sternberg, 2008)

2.3.3.1. Influences on Economic Viability

According to the IHA, hydropower development has the potential to contribute to sustainability, particularly by improving *"economic viability"*(IHA, 2003: 71), preserving *"ecosystems"* (71) and enhancing *"social justice"* (71).

The extensive lifetime of hydropower stations assure long-term services. Indeed, the IHA (2003) describes hydropower as highly efficient, with a lifetime of 50 to 100 years and more (71). Thereby, assuring the energy production throughout several generations to come. (Sternberg, 2008; IHA, 2003) The IHA (2003) argues that after the construction phase only the annual operating and the maintenance need to be covered which represent only 1 % (71) of the capital expenditure.

Furthermore, the IHA believes that these projects enable developing countries to reach certain independence in energy supply, as well as in management capacity as the technology is quite easy to handle. That way, unnecessary currency and local resource transfers from developing to developed countries can be prevented.(Briscoe, 1999; IHA, 2003)

In comparison to other available renewable energies, such as wind, solar or geothermal, hydropower cannot only produce higher amounts of energy but also provides water supply for irrigation purposes used for food production and fisheries, prevents floods or even guarentees access to drinking water through the regulation of river flows.(Hailemaria, 2011; IHA, 2003; Briscoe, 1999)

In the case of the GERD, the construction of the hydropower station will indeed realise several of the advantages cited in Table 6, such as induce regional development with the construction of roads and a 235 m long (Salini Impregilo S.p.A, 2014) bridge over the Blue Nile. Furthermore, assuming that enough precipitation is provided and that the total energy capacity is produced, the GERD will generate a high energy efficiency, and thus, allow energy independence by exploiting a national resource.

The following table points out the already mentioned advantages of hydropower on the economy, and also adds the disadvantages.

TABLE 6: THE INFLUENCE OF HYDROPOWER ON THE ECONOMY

Economic Aspects	
Advantages	Disadvantages
✓ Provides low operating and maintenance costs ✓ Provides long life span (50 to 100 years and more) ✓ Meets load flexibly (i.e hydro with reservoir) ✓ Provides reliable service ✓ Includes proven technology ✓ Instigates and foster regional development ✓ Provides highest energy efficiency rate (payback ratio and conversion process) ✓ Generates revenues to sustain other water uses ✓ Creates employment opportunities ✓ Saves fuel ✓ Provides energy independence by exploiting national resources ✓ Optimizes power supply of other generating options (thermal and intermittent renewables)	- High upfront investment - Precipitation-dependent - In some cases, the storage capacity of reservoirs may decrease due to sedimentation - Requires long-term planning - Requires long-term agreements - Requires multidisciplinary involvement - Often requires foreign contractors and funding

Source: (IHA, 2003: 14)

2.3.3.2. Influence on Social Justice

According to the IHA (2003), social justice is possible through the raise of equity between present and future generations; between local and regional communities; between vulnerable social groups and society at large; and between

nations. In fact, the development of hydropower would allow future generations to benefit from a *"cleaner world"* (IHA, 2003: 73) and a *"legacy of electricity source"* (73) which do not exhaust *"natural resources such as fossil fuels"* (73).

In addition, as hydropower emits very little air pollutants, the propagation of atmospheric pollution across borders as well as climate changes can be avoided.

Another important effect of developing hydropower is the contribution brought to mitigate poverty by better *"managing freshwater and food supplies"* (75).

However, as the GERD is built mainly for electricity generation purposes it might provide improved living conditions assuming that the local population is supplied with the produced energy and not everything is exported to neighboring countries. In addition, as mentioned previously in this thesis, the construction of the hydropower station goes along with the development of infrastructure, which will contribute to enhance the territory accessibility.

The GERD and the creation of its reservoir will directly affect the local population which is mainly composed by indigenous people of Gumuz and Berta. According to the field report conducted in 2012 by International Rivers Network, despite being aware of the project, the population does not fully understand the extent of it.

The local population is going to be severely affected by the inundation of their lands as they mainly depend on agriculture for their livelihoods as well as *"livestock rearing"*, *"fishing"*, *"honey production"*, *"traditional gold mining"* (International Rivers Network, 2012: 3). Therefore, the compensation of the lost lands needs to be rightfully dealt with to avoid and mitigate as much as possible the negative impacts that are going to follow.

The local population is planned to be displaced from the inundated area to resettlement sites. The survey from 2012 states that around 12,500 indigenous people (International Rivers Network, 2012: 4) will need to leave their homes and villages in the reservoir area as well as further downstream from it.

Furthermore, the water quality of the inundated area is very likely to deteriorate leading to health risk for the population in case there is consumption of the polluted water. Moreover, largely extended areas of flooding constitute favorable environments for breeding waterborne diseases, hence, endangering once more the population.

The following table points out further advantages and disadvantages that hydropower contributes to society.

TABLE 7: THE INFLUENCE OF HYDROPOWER ON SOCIETY

Social Aspects	
Advantages	Disadvantages
✓ Leaves water available for other uses ✓ Often provides flood protection ✓ May enhance navigation conditions ✓ Often enhance recreational facilities ✓ Enhances accessibility of the territory and operation with a high of local manpower ✓ Improves living conditions ✓ Sustains livelihoods (freshwater, food supply)	- May involve resettlement - May restrict navigation - Local land-use patterns will be modified - Waterborne disease vectors may need to be checked - Requires management of competing water uses - Effect on impacted peoples' livelihoods need to be addressed

Source: (IHA, 2003: 14)

CHAPTER 3: INSTRUMENTS FOR A DESIRED COOPERATION IN NILE RIVER BASIN

In the previous chapter the different influences caused by the GERD on the population have been defined. The next chapter will present the political situation in the NRB.

3.1. Current Situation of the Water Shares between Riparian States

The rapid growth of East Africa's population makes it obvious that the issues related to water distribution and water management are extremely important. Not only to preserve the Nile River, but also to maintain peace and prevent future conflicts between the riparian States. In fact, this task might seem nearly impossible considering that each of the ten riparian States claim their own rights on the Nile waters, and each wish to accomplish, in different extents, their own specific goals.

For instance, Burundi and Rwanda have similar interests and claim their 'riparian rights' on the Kagera River, which is important for the balance of Lake Victoria.(Tadesse, 2008) Likewise, Kenya, Tanzania and the DRC demand their own 'riparian rights' on Lake Victoria. In addition, Ethiopia, being the main source of the Nile River, esteems to have the right to the Nile water entitlement, particularly for the use of irrigation and hydroelectric power purposes.

However, Tadesse (2008) further states that regardless of the upstream States needs and interests, the downstream States, require to maintain their 'prior appropriation' right. Moreover, due to their geographical position, the downstream States are very concerned about the environmental degradation and the deterioration of the Nile water. Accordingly, Egypt and Sudan are unwilling to accept the allocation of claims by the upstream States.

Since the 1929 Nile water Agreement (NWA) had been signed, Egypt and Sudan have tried to endeavor to maintain their established status quo over the other riparian States. In addition, *"the riparian communities are very dependent on*

exploitation of environmental resources for their livelihoods and general wellbeing" (Nile Basin Initiative, 2012: 227). Indeed, according to the NRI the environment provides between 40 % and 60 % of the GDP (227) of the riparian States.

3.2. The Water Agreements of the Nile River Basin

Nevertheless, there have been several attempts of negotiation and a few agreements signed between the riparian States, as will be presented in the second part of this chapter. Before focusing on the agreements established in the NRB, the International Water Law Regime is presented to obtain a general idea of the implications regarding the establishment of agreements between riparian States.

3.2.1. International Water Law Regime

As UNESCO (2003) argues, the *"sharing of water in international rivers is a matter of principles and rules that developed over centuries"* (UNESCO-IHE et al., 2003: 2 - 10). Hence, the International Law Regime evolved from both international conventional and customary law which rule over the shared use of international waters. UNESCO (2003) affirms that, to date, the use and share of water resources is a rightful element of states affairs. Furthermore, the allocation of water resources is governed by a number of principles in respect to the management of international water resources.(UNESCO-IHE et al., 2003) Indeed, UNESCO (2003) cites those principles as follows:

- **Sovereignty principle: each nation has the right to develop its own policies, laws and institutions and their own strategies for natural resources development and utilization;**
- **Transboundary principle: upstream water users have a responsibility towards downstream water users, and vice-versa; this principle is in a sense the extension of the equity and precautionary principles across national borders;**

- **<u>Equity principle</u>: all people have basic rights of access to resources for their survival and development; no groups in society should be put at a disadvantage in this respect;**
- **<u>Intergenerational principle</u>: future generations should not be deprived from access to an adequate resource base;**
- **<u>Water-as-an-economic-good principle</u>: users should pay the economic value of the water used, provided that the price of water is affordable and that this principle does not conflict with the equity principle (which is higher on the ladder);**
- **<u>Polluter-pays principle</u>: he who inflicts damage on the natural resources system should pay for the damage;**
- **<u>Precautionary principle</u>: governments are obliged to protect citizens against risks and from disasters, even if such risks have not yet been established by scientific proof; this principle applies to prevent or reduce pollution against specific pollutants. (UNESCO-IHE et al., 2003: 2-9)**

However, the most important and fundamental principle in regard to the management of international water resources is the principle of 'reasonable and equitable utilization' (UNESCO-IHE et al., 2003: 2-10). According to UNESCO (2003), this principle is to be found in the Helsinki Rules of 1966, and in the UN Convention of 1997. In fact, UNESCO (2003) cites the principle of equitable and reasonable use as follows:

> **Article IV of the Helsinki Rules:**
> **Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.**

Note that, UNESCO (2003) argues that *"among riparian states, the principle of reasonable and equitable utilization underlines equal rights and not equal apportionment"* (2–11). This means that rather than the definition of water quantity

allocated to each riparian state, the principle defines the rights to access and quality of water each riparian state is entitled to.

The International Water Law Regime has been established long after the first settlements between riparian States in the NRB as several of them were signed under colonial times. Therefore, the following point analyses the different agreements governing the NRB starting from the ones signed under colonial times.

3.2.2. Nile water Agreements

The International Water Law Regime has been established long after the first settlements between riparian States in the NRB as several of them were signed under colonial times. Therefore, the following point analyses the different agreements governing the NRB starting from the ones signed under colonial times.

The Nile water's conflict managements and cooperation periods can be traced and separated into three major phases, namely the *"exclusive existing agreements"*(Bitsue, 2012: 3) from 1891 to 1959, the *"inconclusive cooperation"* (3) from 1967 to1993, and the *"inclusive"*(3) NBI process and CFA from 1995 to 2011.

3.2.2.1. Historical Agreements

The beginning of the conflict management over the use of the Nile River started around the 1890s and the negotiations lead to two major bilateral agreements settled in 1929 and 1959.(Abdo, 2004) In fact, British colonialist were very interested in controlling the Nile waters for irrigation purposes, on the one hand, necessary for the cotton plantations growing in Egypt and Sudan, and on the other hand, for the transportation of that cotton back to Great Britain. (Arsano 2007, Bitsue 2012, and Tadesse 2008)

In 1891, Great Britain and Italy agreed on each of their 'sphere of influence' leading to the Anglo-Italian Protocol allowing Great Britain to expand its control over the Atbara River. (Arsano, 2011) Arsano (2011) argues that in the following period, a number of other protocols and agreements have been approved by the colonial powers, such as Great Britain, Belgium, France and Italy. However, he explains that all of these agreements empowered Great Britain to enhance the diffusion of its control over the Nile waters. Moreover, Arsano (2011) explains that all of the negotiations and agreements settled in that period were settled without any

consideration of the other riparian States and with the only aim to carry out the different interests of the colonial powers.

However, Great Britain noticed that in Egypt, the amount of water was not as high as in Sudan. Therefore, Great Britain made an agreement with Sudan to be able to regulate and use the water without having to consult the other riparian States.(Tadesse, 2008) This led to another agreement that was agreed on between Egypt and Sudan, stating that *"the upper riparian states"* (Tadesse, 2008: 5) should not perform any work that might affect Egypt's or Sudan's volume of water, without consulting with them first; although 86 % of the Nile water running through Egypt and Sudan stem from Ethiopia.

In 1902, Great Britain signed together with Ethiopia an agreement that mainly regarded the regulation of Ethiopia's and Sudan's borderlines, yet mentioned in Article III the use of the Nile waters. (Tadesse, 2008) Indeed, the Emperor of Ethiopia, Menelik II, agreed on not constructing any work across the Blue Nile River, Lake Tana or the Sobat River that would cease the water flow into the Nile. Tadesse (2008) explains, that conforming to the Amharic[6] version of the 1902 agreement, as long as the Emperor Menelik II *"did not 'stop' the flow of the waters, Article III did not restrict him from diverting the water"* (Tadesse, 2008: 7), which left Egypt and Sudan even more concerned. Nevertheless, Ethiopia *"renounced the 1902 agreement, invoking the Egyptian and Sudanese practice of denouncing 'unequal' colonial-era treaties when they are not in Egypt's or Sudan's interest, respectively"* (7).

3.2.2.2. 1929 and 1959 Nile water Agreements

The 1929 NWA, called the Anglo-Egyptian Agreement, was an exchange of notes that occurred between Great Britain and Egypt regarding 'the historical and natural right' of Egypt over the Nile waters. (Arsano, 2011) In addition, without the consent of any other of the riparian States, the Anglo-Egyptian Agreement established that Egypt was entitled to 48 billion cubic meters (Bitsue, 2012: 4) of water per year, whereas only 4 billion cubic meters (4) of water per year were allocated to Sudan. Indeed, Arsano (2007) describes in short the agreement between both states as:

[6] Amharic is the official working language of the Federal Democratic Republic of Ethiopia.

> **(1) Egypt would take all the waters of the Nile except the 4 bcm to be retained in Sudan. (2) Egypt would supervise all water-related activities in the entire basin from source to mouth. (3) Britain recognized the "historical" and "natural" rights of Egypt with respect to the waters of the Nile. (Arsano, 2007)**

On top of that, the agreement assured to Egypt that the Eastern riparian States were not allowed to carry on with any *"water development projects in the Equatorial Lakes"* (Bitsue, 2012: 4) without conferring with the downstream States.

The 1959 NWA was induced by Egypt proposing and carrying on with the construction of the Aswan High Dam in 1952. In fact, when Egypt proposed to build the Aswan High Dam with a capacity of 164 billion cubic meters per year (4), Sudan claimed that Egypt was *"overexploiting the Nile River at the expense of Sudanese, and threatened to ignore the terms of the 1929 agreement by unilaterally carrying out irrigation projects"* (4). Therefore, Sudan claimed for the *"reallocation of [its] Nile water rights"* (Arsano, 2011: 3) and strived for its rights to *"fair usage of the water"* (3). Consequently, in 1959, a bilateral agreement was signed between Egypt and Sudan, stating that the storage created by the Aswan High Dam was to be regulated by both States, and in addition to that, *"Sudan was allowed to construct several dams and reservoirs to utilize its own water share"* (Bitsue, 2012: 4). Another reason for the signature of this agreement was that the average flow of the Nile River was set at 84 billion cubic meters per year and that *"the water lost in evaporation was to be equally divided between Egypt and Sudan"* (4). Hence, the 1959 NWA was actually the recognition of the *"notion of acquired rights"* (4) by the two signatories.

Once more, all the other riparian States were left out from negotiations and the decision-making process. Ethiopia, however, declared from the start that it did not consider any of both agreements binding as they were not a party of these agreements. In addition, once the other riparian States obtained their independence, they as well rejected the agreements concluded by the downstream States and claimed for their *"sovereign rights"* (Arsano, 2011: 3) as upstream riparian States. In particular, Kenya, Uganda and Tanzania did not accept as binding any of the

agreements including the NWAs, as they did not participate to any of the negotiations and might have been *"prejudicial to their sovereign rights and national interests"* (4).

3.3. Recent Agreements and Initiatives

The NWAs settled between Egypt and Sudan were, in a way, the starting point of the Nile waters management. However, as mentioned earlier, the NRB stretches over nine more countries that are as much entitled to the waters as are Egypt and Sudan. In the following part, the recent agreements and initiatives settled between the riparian States are presented.

3.3.1. Regional Cooperation

As mentioned before, the upstream States did not consider any of the NWAs as binding. To avoid severe water conflicts between the riparian States, there were several attempts to solve at conflicts in the form of cooperative initiatives and projects. Indeed, Bitsue (2012) cites some of those initiatives as follows:

> **In May 1967, HYDROMET, a project designed to collect hydro-meteorological information from the catchments of lakes Victoria, Kyoga and Albert within the Nile Basin, was established after being agreed to by Egypt, Kenya, Sudan, Tanzania and Uganda. The United Nations Development Program (UNDP) and the World Meteorological Organization supported the idea. The HYDROMET survey came to an end in 1992. (Bitsue, 2012: 5)**

However, before the HYDROMET came to an end, Ethiopia and Sudan strived to find an arrangement over the Blue Nile and the Atbara River. This lead to Egypt being concerned about the new arrangement between Ethiopia and Sudan, and therefore agreeing with Ethiopia not to interpose with each other over the Nile River. The agreement was established in 1993 between the two riparian States, under a *"framework of general cooperation"* (Bitsue, 2012: 5).

Another project that was established in 1983 was the UNDUGU project which mainly dealt with different development matters such as infrastructure, environmental cooperation, culture and trade in the areas of the NRB. (Adar, 2007) However, the HYDROMET and the UNDUGU projects were not able to supply *"a clear and specific legal regime for the utili[z]ation of the Nile River basin"* (8). As those projects failed, a further project was established that focused mainly on environmental matters and water quality control before including the important issue of *"equitable utili[z]ation"* (8) of the Nile River waters. According to Bitsue (2012), the Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin (TECCONILE) was formed in 1993 when the water resource Ministers from the DRC, Egypt, Rwanda, Sudan, Tanzania and Uganda signed an agreement in Kampala, Uganda. He says that the remaining four riparian States participated as observers. The TECCONILE project started on January 1st 1993 and its secretariat was based in Entebbe, Uganda. (Bitsue, 2012)

Nevertheless, Arsano (2007) believes that the different initiatives were implemented mainly by Egypt with the primary aim of growing their water supply, and therefore, they were not of an important use in terms of gathering all of the riparian States. Those initiatives did not bring any concrete benefit to a basin-wide cooperative framework involving all of the riparian States. To date, the first and only project that involves all riparian States and enjoys their unanimous support is the Nile Basin Cooperative Framework Agreement under the auspices of the Nile Basin Initiative. (Tadesse, 2008)

3.3.2. Basin-Wide Cooperation

3.3.2.1. Nile Basin Initiative

The Nile Basin Initiative (NBI) is a regional intergovernmental partnership inaugurated on February 22nd 1999 by the council of Ministers of Water Affairs of the Nile Basin or the Nile Council of Ministers (Nile-COM). The Nile-COM forms the NBI highest authority organ and is in charge of most of the decision-making within the Nile Basin. In addition, to the Nile-COM, the NBI includes on the one hand, the Technical Advisory Committee (Nile-TAC), who provides aid to the Nile-COM and recommendations for technical issues. On the other hand, it includes the Nile Basin Initiative Secretariat (Nile-SEC), whose role is to manage administrative

matters as well as provide guidance to the Nile-TAC and the Nile-COM. (Nile Basin Initiative, 2014; Paisley and Henshaw, 2013; Timmerman, 2005)

The NBI strives to encourage *"equitable utilization of the Nile and the sharing of the benefits of its resources"* (Bitsue, 2012: 5). Indeed, the effort that the members invest in finding resolutions to the water management issues clearly shows that there is a mutual desire to improve cooperation and find solution to these issues that can be of benefit to all of the riparian States.

Originally the NBI was supposed to be a temporary institution until a binding agreement, the Nile Basin Cooperative Framework Agreement, was established between the riparian States and thus, included the signature of all eleven countries. However, the negotiations lasted much longer as expected, and therefore the NBI is still in place today. (Paisley and Henshaw, 2013; Timmerman, 2005)

According to Paisley and Henshaw (2013), at present, the NBI has had a formal legal status as an institution only in Uganda (NBI headquarter), Rwanda (NELSAP[7] headquarter) and Ethiopia (ENSAP[8] headquarter). Moreover, the NBI has been involved in the implementation of a number of projects called Shared Vision Programs (SVP) with the main goal of achieving sustainable socio-economic development using equitably the basin water resources. (Nile Basin Initiative, 2014) Supposedly, the main participants of the SVP projects are national governments, local governments for sub-national jurisdictions within the Basin, NGOs, private sectors, universities and other research institutions. (Timmerman, 2005) (See appendix 4 for a more exhaustive list of the different institutes involved in the NBI).

3.3.2.2. Nile Basin Cooperative Framework Agreement

To date, the Nile Basin Cooperative Framework Agreement (CFA) is the most recent legal framework that has been approved by most of the riparian States.(International Water Law Project Staff, 2013) However, before coming to an understanding, the riparian States negotiated with each other for a period of ten years. (Bitsue, 2012) The CFA was first adopted in May 2009 by *"seven votes to one"* (6) during the Nile-COM meeting in Kinshasa, DRC. Ethiopia, Kenya,

[7] Nile Equatorial Lakes Subsidiary Action Program (NELSAP)
[8] Eastern Nile Subsidiary Action Program (ENSAP)

Rwanda, Tanzania and Uganda signed the agreement one year later and Burundi followed afterwards and signed in February 2011.

However, according to Bitsue (2012), the downstream States, in particular Egypt, are not ready to renegotiate the terms of the 1959 NWA. He argues that Egypt is against the CFA mainly due to three reasons. Firstly, Egypt believes that the upstream States need to consult with the downstream States before conducting any kind of water related projects and need to receive their permission to implement them. Secondly, Egypt requires access to an annual quota of 55.5 billion cubic meters of water, which follows the 1959 NWA. Thirdly, Egypt rejects Article 14 (b) of the CFA on water security as the proposed paragraph states that *"Nile Basin states agree not to significantly affect the water security of any other Nile Basin state"* (International Water Law Project Staff, 2013), whereas Egypt would like to reformulate it as *"not to adversely affect the water security and current uses and rights of any other Nile Basin state"*(International Water Law Project Staff, 2013).

Accordingly, the NBI has permitted to bring together all riparian States for negotiations, which is considered as a step forward. Some riparian States were willing to reach cooperation and showed their efforts concerning issues of management and development of the Nile River waters. However, as can be seen on Figure 5 in appendix 2, not every riparian State has signed the NBI and there still are disagreements regarding the CFA. This shows that the risk of outbreaks of conflicts are still very high, as mistrust and suspicion still prevail among many riparian States. (Abdo, 2004) In fact, Abdo (2014) points out that for cooperation over shared water resources to be possible, the existence of a legal framework is essential. He further points out that without a legal arrangement in place cooperation cannot be sustained.

3.4. Other Stakeholders Involved in the Improvement of Cooperation

The last part of this chapter presents several important contributors and stakeholders that are involved in the promotion of cooperation between riparian States and work in finding solutions to the different issues arising in the NRB. Those institutions were mainly found with the purpose of minimizing or alleviating the deterioration of the Nile River.

3.4.1. African Union

According to the United Nations Environment Program (UNEP), the African Union (AU) Commission has been dealing with River and Lake Basin authorities under the auspice of the African Network of Basin Organizations (ANBO). Indeed, the AU has elaborated policy and institutional framework guidelines in reference to cooperation for sustainable management of transboundary water basins (UNEP, 2010).

3.4.2. New Partnership for Africa's Development

The New Partnership for Africa's Development (NEPAD) is a program of the AU that was established and implemented by African's. According to UNEP (2010), the establishment of the NEPAD was a great stimulus for the AU's water agenda. In fact, thanks to that and the help of the EU, a project called Water Resources Planning and Management in the Nile River Basin was found. This project aims to elaborate and develop studies in transboundary water resources on African basins, in particular the Nile Basin, as well as on national and regional water security. (UNEP, 2010)

3.4.3. The African Ministerial Council on Water

The African Ministerial Council on Water (AMCOW) was formally launched in April 2002 in Abuja, Nigeria (UNEP, 2010: 9). On the one hand, the AMCOW is a specialized technical committee of the AU that encourages cooperation on water and sanitation. On the other hand, the AMCOW is involved in *"strengthening relations between Regional Economic Commissions […] and River and Lake Basin Organizations […] in order to implement the AU Sirte Declaration on Agriculture and Water"* (9). Furthermore, the AMCOW is engaged to *"enhance cooperation and coordination, [as well as] promote the development and implementation of coherent policies and strategies for water resources management"* (9).

3.4.4. The African Ministerial Conference on the Environment

Another specialized technical committee of the AU cited by UNEP (2010) is the African Ministerial Conference on the Environment (AMCEN). This committee was established in Cairo, Egypt in 1985 (UNEP, 2010: 10) right after the Cairo Program for African Cooperation had been adopted. The AMCEN mainly works on

improving cooperation between the different African governments on economic, technical and scientific activities in order to impede the deterioration of the African environment. (UNEP, 2010)

3.4.5. Intergovernmental Authority on Development

The Intergovernmental Authority on Development (IGAD) is a *"seven-country regional development organization in East Africa"* (UNEP, 2010: 11) (Djibouti, Ethiopia, Eritrea, Kenya, Somalia, Sudan and Uganda). UNEP (2010) states that the Nile system is one of the five catchment areas included in the IGAD. Furthermore, in April 2007, a project called Environment and Natural Resources Strategy was established by the IGAD with the specific aim of enhancing *"the integration of environmental and natural resources concerns into development frameworks for environmentally sustainable economic development in the region"* (11).

3.4.6. East African Community

As UNEP (2010) describes it, the East African Community (EAC) is an intergovernmental organization which members are Kenya, Tanzania and Uganda. Those three members endeavor to organize and correlate *"their policies on sustainable use of the Lake Victoria Basin"* (UNEP, 2010: 12). Furthermore, to promote growth and remove poverty in the Nile Basin the EAC deals in several other areas that is *"energy, transport, communication, forestry, tourism, agriculture, fisheries, livestock, mining and other areas of social economic development"* (12).

However, to be able to reach those goals the EAC needs to use great quantity of water provided from the lakes and rivers. Hence, the EAC are directly implicated with Egypt, and need to strive for future arrangements related to the management of the Nile Basin waters. Evidently, the EAC *"shall cooperate with other interested parties, regional or international bodies and programmes"* (12) with the intention of allowing a healthy relationship between the Lake Victoria Basin and the NRB as they both are connected.

3.4.7. World Bank and Regional Multilateral Development Banks

Development banks, such as the World Bank (WB) and regional development banks, are also much involved in the development of hydropower stations, on the one hand, for financial purposes and technical support, on the other hand, for drafting the hydropower development projects. (Hailemaria, 2011) In fact in 2000, the WCD established guidelines that policy-makers need to be aware of prior to implementing new hydropower projects. Nevertheless, the support from development banks is not granted to a hydropower project that easily. In fact, the development banks have recognized the WCD's guidelines and use them as prerequisites for determining whether or not to finance a specific hydropower project. Thereby, hydropower development projects will only be funded by the WB and/or other regional development banks in case the WCD's principles have been taken into consideration and respected in the planning of a hydropower project. (Hailemaria, 2011; WCD, 2000)

In other words, developing countries need to follow rigorously the established guidelines if they care to obtain support from international organizations mostly because funding the projects one of is *"their biggest challenge"*(Hailemaria, 2011: 27).

CHAPTER 4: FRAMEWORK PROPOSAL FOR ETHNIC CONFLICTS SETTLEMENT

The final chapter of this thesis will propose a framework that can be used as a mechanism for alleviating tensions between ethnic groups in the NRB that could exacerbate to more severe conflicts. This will be done by using the case of the GERD project.

As presented in the second chapter, the NRB stretches out over eleven riparian countries and covers a very large area of land, that is around 3,349,000 square kilometers (Chonguiça, 2008: 6), which represents approximately 10 % of Africa's surface. Further, the Nile River represents an important natural source for the basin population and is home to around 160 million people (Pottinger, 2004: 1).

Hence, it suggests that a large number of different tribes, ethnic groups and indigenous groups are, directly or indirectly, dependent on the Nile waters. Furthermore, those groups are likely to be subject to ethnic conflicts emerging due to the lack of development management and weak transboundary coordination in the NRB.

4.1. Implications of the GERD in Ethnic Conflicts Settlement

The framework proposal for ethnic conflicts settlement in regard to the recent GERD project can now be established taking into consideration the information gathered in the previous chapters.

4.1.1. Social-Environmental Implications of the GERD at Local Level

As mentioned earlier, the WCD (2000) established guidelines that policy-makers are recommended to take into consideration prior to the implementation of new hydropower projects. The guidelines were established mainly to deal with matters such as sustaining rivers and livelihoods, gaining public acceptance or addressing existing dams. Those guidelines are used as references for the formulation

of policies and regulations, such as the Environmental Impact Assessment (EIA) and the Social Impact Assessment (SIA) of large dams. (WCD, 2000) Even though it is not a legal obligation, the EIA is, very often than not, integrated in procedures as a legal requirement for the planning and implementing of large-scaled hydropower development projects. (Hailemaria, 2011; WCD, 2000)

Nevertheless, as was mentioned in the second chapter, at present, the GERD project has no published Environmental and Social Impact Assessment (ESIA). Consequently, the impacts are likely to affect the two ethnic groups Gumuz and Berta. (Consultancy Services, 2014; EEPCo, 2010)

Recommendation 1: Performance and publication of a thorough ESIA on the GERD project.

Indeed, a first recommendation in regard of the present framework proposal for ethnic conflicts settlement would be to carry out the ESIA for the GERD project regardless of the fact that it already is in construction phase as to clearly determine the impacts arising from it.

As stated in the second chapter of this thesis, the GERD project in Ethiopia will cause noticeable environmental changes and therefore, will lead to important social impacts on the local population in the Benishangul-Gumuz region. In particular, the GERD project will displace a great number of indigenous people mainly composed of two ethnic groups, which are the Gumuz and the Berta ethnic groups. These groups are going to be affected by the impacts arising during the construction phase of the dam, and later due to the filling of the reservoir.

To illustrate why a ESIA needs to be carried out urgently for the GERD project is, first of all, because the livelihood of the Gumuz and Berta people is about to change considerably and they are entitled to specific rights in regard to the status of ethnic minorities. Second of all, the advantage of having an ESIA will allow the local community to better prepare themselves to the change. Thirdly, it will provide the information necessary for establishing resettlement and compensation mechanisms for the affected people.

Furthermore, in one of the thematic reviews prepared for the WCD in 2000, the author argues that the development of dams has indeed been affecting indigenous

peoples and ethnic groups physically but also psychologically. In fact, those minorities are subject to cultural alienation, dispossession of land and resources, inadequate compensation and human rights abuses, to name a few. (Marcus Colchester, 2000)

This is the reason why the first suggestion, in regard of the present framework proposal for ethnic conflict settlement, is to establish the necessary capacity to implement an accurate ESIA for the GERD project.

4.1.2. Displacement, Resettlement Development Programs and Rehabilitation

Several studies(Cernea, 2013; Marcus Colchester, 2000; WCD, 2000; Bartolome et al., 2000) conducted in the past have shown that displacement due to development projects, such as hydropower projects, result in serious socio-economic, and environmental stresses among the affected population.

According to Bartolome et al. (2000), displacement is defined as a multidimensional phenomenon that can resume in several important outcomes. However, the phenomenon is very often reduced to one of its many outcomes, namely the physical rehabilitation. In many cases, resettlement programs focused mainly on the procedure of physical rehabilitation instead of promoting the socio-economic development of the displaced communities. This means that, resettlement sites are, more often than not, selected without really taking into consideration factors such as the *"availability of livelihood opportunities"* (Bartolome et al., 2000: 6) or simply the personal choices of the affected people themselves.

Furthermore, the effect of displacement on ethnic groups and indigenous groups is even more striking for the socio-cultural change is greater and the risk of deprivation of common property resources is higher. In fact, the impacts affecting critically the livelihood of ethnic groups and indigenous peoples are the loss of access to traditional means of livelihood and the loss of surface for livestock grazing lands, fishing grounds and forests and other resources. (WCD, 2000; Marcus Colchester, 2000; Bartolome et al., 2000)

However, this should not be the way forward for the resettlement of the Gumuz and Berta ethnic groups during the filling of the GERD reservoir. Note that, the resettlement area for the GERD project has been determined, however, specific

details such as the nature of the resettlement, the size and location of the site and the condition of the resettlement area, have not been revealed yet. Regardless, the following recommendations should be taken into consideration when the time for resettlement comes.

Recommendation 2: Establishment and implementation of resettlement development programs as a means to rehabilitation of the Gumuz and Berta ethnic groups subject to displacement by the GERD project.

Indeed, the past recommendation implies that the matter of displacement due to the construction of the GERD should be approached as a separate development project, namely as resettlement development programs with the main objective of promoting socio-economic development and preventing the impoverishment of the Gumuz and Berta people.

According to Bartolome et al. (2000), rehabilitation can only be ensured through development. Furthermore, for resettlement programs to be qualified as development, they need to focus on the following:

- **Enhancement of capabilities; and**
- **Expansion of social opportunities by addressing the social and personal constraints that restrict peoples choices. (Bartolome et al., 2000: 8)**

Recommendation 3: Establishment and implementation of an impoverishment risk analysis of the Gumuz and Berta ethnic groups subject to displacement by the GERD project.

As for the prevention of impoverishment, the key would be to implement an impoverishment risk analysis, such as the Impoverishment Risk and Reconstruction

(IRR) model[9] proposed by Cernea in the 1990s. In fact, throughout his model Cernea (2013) defines the nine risks that induce impoverishment as landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity and mortality, loss of access to common property and education opportunities. However, Cernea proposes to mitigate those risks by targeting them in reverse that is landlessness to land-based resettlement, for instance, or homelessness to house reconstruction. (Cernea, 2013; Bartolome et al., 2000)

Recommendation 4: Integration of host communities in resettlement development programs.

Equally important, is the integration of host communities into the resettlement development programs to prevent that the livelihood of host communities is not negatively impacted to the detriment of those resettled among them. This recommendation is very important and needs to be taken into high consideration mainly because the lack of integration of host communities eventually will lead to tensions between hosts and resettlers. In fact, those tensions are likely to escalate to ethnic conflicts over arable land, other natural resources, or social services, for instance. (Bartolome et al., 2000)

Note that, such a conflict has happened before among NRB ethnic groups, namely the Sudanese Nubians that were displaced due to the Aswan High Dam and resettled to an area inhabited by Shukriya pastoralists. In fact, the Shukriya pastoralists continued to graze their animals on land allocated to the Nubians for farming. Eventually in 1974, the conflicts escalated and the Sudanese Army had to intervene as to protect the fields cultivated by the Nubians. (Marcus Colchester, 2000)

Therefore, the integration of host communities in the resettlement development programs will prevent such tensions and at the same time allow their live standards to rise. (Bartolome et al., 2000)

[9] See appendix 5

4.1.3. Social, Environmental and Economic Implications of the GERD at Basin Level

As stated in the previous chapters, one of the main objectives of the GERD project is the production of electricity which will supposedly contribute to the economic growth of Ethiopia. Nevertheless, the new dam will not only contribute to changes within Ethiopia, but also the NRB to some extent. In particular, as the GERD is located on the Blue Nile close to the border with Sudan, the influences of the GERD will be more pronounced downstream. Therefore, the enhancement of cooperation and the dialogue between, Egypt, Ethiopia and Sudan are very important for the risk of conflicts is increasing at present.

Recommendation 5: Promotion of dialogue and establishment of benefit sharing mechanism between Egypt, Ethiopia and Sudan as well as the establishment of coordinated development plans.

Indeed, a possible way of dealing with the situation would be to establish benefit sharing mechanisms between those three riparian States leading to more cooperation in the NRB.

To illustrate, the benefits provided by the GERD from which the riparian States could benefit from are water conservation due to minimized evaporation, the management of siltation by mitigating erosion and deforestation, especially in the Ethiopian Highlands, or the enhancement of power trading due to increased power availability, for instance.

Indeed, the fact that water will be stored in the Blue Nile Gorges, the losses occurring through evaporation will be alleviated. Even if the annual allocation in Egypt needs to be diminished due to storage upstream, the loss will not be as great for the evaporation of millions of cubic meters will be saved in the Blue Nile Gorges. (Millington, 2000; Tesfa, 2013) In fact, a study was published in April 2014 indicating that the performance of the Aswan High Dam will remain at a reliability level of 96 % (Mulat and Moges, 2014: 598) even after the completion of the GERD. Furthermore, the net evaporative water loss from the exposed surfaces of the Aswan High Dam and the GERD reservoirs will potentially be reduced by 16 % (598). The

authors explain that the water loss is lower because of the operation of the Aswan High Dam at reduced water level.

Tesfa (2013) suggests that after the construction of the GERD is terminated, sedimentation in the Blue Nile will be diminished up to 86 % (Tesfa, 2013: 9) downstream considering that the dam runs at full capacity. In fact, *"further water storage was planned in Ethiopia […] with a corresponding reduction in the role of the downstream Roseires Dam"* (Millington, 2000: 26) in Sudan. Thereby, allowing the reduction in siltation downstream.

Despite the fact that sedimentation will be reduced downstream, upstream of the GERD sedimentation will still be present unless mitigation measures are taken to alleviate erosion and deforestation. Indeed, this could be another opportunity to promote cooperation among the riparian States where Egypt, Ethiopia and Sudan would work together to cope with the issues of erosion and deforestation in the Ethiopian Highlands. Hence, new development programs can be established and trust can be gained between the different communities, and thereby, tensions between ethnic groups can be alleviated. (Tesfa, 2013)

Recommendation 6: Basin-wide SEIA and establishment of coordinated decommission strategies in the NRB.

Indeed, the Nile riparian States should be reminded that the excessive development of water related infrastructures especially hydropower, adds further stress on the Nile River. Therefore, there needs to be coordination between the different projects at the basin level.

A relevant argument stated by Turton et al. (2000) in regard to new water projects implemented in the basin is that *"[n]ew dams should only be built if the total benefits exceed the total costs and if this is not possible decommissioning should be considered."* (Turton et al., 2000: 129) Indeed, basin-wide SEIA should be carried out as to determine which infrastructures should be decommissioned and make way for the new projects.

For example the Sennar Dam in Sudan had a capacity of 1 billion cubic meters (Tesfa, 2013: 8) in 1925. Yet, after a long period of time the dam lost around 70 % of its capacity due to sedimentation. Thereby, the original irrigation purposes

for which the construction of this dam was undertaken is no longer met, thus, new assessments need to be carried out as to determine its vitality and whereas there is a necessity for decommission. Several dams in the NRB are in a similar situation, such as the Roseires Dam also in Sudan, which lost 36 % (Tesfa, 2013: 8) of its original capacity, or even the Aswan Dam in Egypt, for instance. Indeed, decommissioning those dams would lead to saving over 6 billion cubic meters (Consulate General of Ethiopia Los Angeles, n.d.: 4) of water in the NRB annually.

4.2. Transboundary Coordination in the Nile River Basin

> *"The responsibility to avoid transboundary damage implies […] that sustainable hydropower developments on river basins shared by several nations must be planned and operated within a shared water management policy, in order to prevent political conflicts about the use of the common resource."* **(IHA, 2003: 75)**

The next point is dealing with the matters of transboundary coordination as it is equally important for establishing the framework proposal for ethnic conflicts settlement.

In the scope of maintaining an ethnic conflict free NRB, the Nile riparian States still need to invest efforts in working together, share their benefits and costs and more importantly leave their differences aside and focus only on the wellbeing of the NRB and its population. The recommendations here are to improve the institutional capacity at the basin level and to promote integrated management of the NRB water resources.

4.2.1. Improved Institutional Capacity of the Nile River Basin

The cooperation between the riparian States in the NRB should be solidified by the presence of a legally binding agreement, such as it is the case in other basins. For example, in the Mekong River Basin, the Mekong River Commission ratified a legal agreement containing *"provisions to share water"* (Millington, 2000: 26; Mekong River Commission, 2014), in particular for flows occurring during the dry season. This, however, requires long-term planning of the whole basin. Therefore,

the creation of a Nile River Basin Commission is a necessity that should not be neglected by any of the Nile riparian States.

Recommendation 7: Create the Nile River Basin Commission as the highest authority in NRB.

Indeed, with the establishment of a basin commission the management across the NRB will be facilitated as the Commission will be grounded on a legally binding agreement. As mentioned in the third chapter of this thesis, the CFA was the first attempt at creating the NRB Commission allowing the riparian States to undertake a first round of negotiations. However, the framework never came into force due to strong disagreements between downstream and upstream riparian States. Meanwhile, 15 years have passed since the CFA has been adopted in Kinshasa (DRC), and yet the riparian States have not come to an understanding. Thereby, it might be the time for the riparian States to start a new round of negotiations and try to come to terms with their differences.

To this end, if there were to be a second attempt of establishing a legal framework for the NRB, the riparian States should consider other alternatives on how to approach the matter.

Recommendation 8: Establish sub-basin legal frameworks as a first step to establishing the basin-wide agreement.

In fact, the NRB accounts a higher number of riparian states compared to other basins, thus, rending negotiations more difficult and more time-consuming. Consequently, there could be the option of narrowing negotiations at sub-basin levels, in a first place, and afterwards use the established sub-basin frameworks as a skeleton for establish an agreement at basin-wide level including all of the riparian States. Thereby, reducing the negotiation forum to sub-basin level will imply that the number of riparian States involved in each sub-basin framework will vary mostly between two and three, except in the case of the Lake Victoria Sub-Basin where five countries are involved (see map on appendix 6). That way, negotiations are going to

be focused on more concrete and apparent figures rather than establishing broad principles as it is the case in many parts of the CFA.

Recommendation 9: Installation of collection centers and an efficient database available basin-wide.

A good basin management can be achieved when reliable data are available to decision-makers. *"Hydrological data, combined with data on the use of water, allows present and future demand and supply of water to be projected […] combined with socio-economic, cultural environmental and other related data."* (Millington, 2000: 28)

Therefore, efforts should be put in the installation of data collection centers and research facilities across the whole NRB, where technical experts can collect and analyze the data. In this regard, a database should also be established for the collected data to be available to all riparian States as a source of knowledge for future relevant decision-making and for the effective planning of new water projects and infrastructures.

Moreover, the Nile riparian States should be open to discussions regarding changing trends that might occur in the basin's behavior. Accordingly, to deal with those types of issues, the riparian States need to be more flexible when it comes to decision-making and allow possible adjustments of the according legal frameworks.(Millington, 2000; Turton et al., 2000)

Recommendation 10: Promotion of public participation.

Public participation is not only important in the case of a singular project but also in the management of the entire basin. Indeed, the NBI should organize *"community participation processes"* (Millington, 2000: 34) as to promote public awareness as much as possible. Moreover, the participation of locals can be beneficial for decision-making as they represent a further way to collect information, especially on land-use practices and cultures of the basin as well as specific knowledge of ecosystems or even practical indigenous know-hows.(Turton et al., 2000)

4.2.2. Integrated Management of the Nile River Water Resources

Development management is an important point to consider when it comes to conflict settlement as it is one of the main reasons for recent tensions in the NRB and affects the population, in particular ethnic groups. In fact, to avoid discords, the management of development projects in the Basin needs to be planned and implemented with the coordination of all the riparian States. The GERD project, for example, was planned and implemented by Ethiopia without including Egypt and Sudan. That unilateral act from the part of Ethiopia illustrates that the NRB lacks in development coordination and integrated management.

Recommendation 11: Establishment of integrated management strategies for the whole Basin.

Thereby, project proposals should be established in coordination with already existing water infrastructures throughout the NRB. Indeed, integrated management strategies are the way to go in regard to achieve cooperation and avoid conflicts between the riparian States. For example, several multilateral development strategies are established in other basins, such as in the Mekong River Basin. In fact, the Mekong River Commission (2014) formulated the Integrated Water Resources Management-based (IWRM) Basin Development Strategy to guide and support national water developments as to be in accordance with the Agreement for Cooperation for the Sustainable Development of the Mekong River Basin. Accordingly, basin development plans can be a useful means for the riparian States to identify and categorize future projects as well as to prioritize on what is best for the Basin. (Mekong River Commission, 2014)

CHAPTER 5: CONCLUSION

5.1. Synopsys

To recapitulate, the major aspects established at the start of this master thesis were as followed:

- Firstly, to define the possible consequences that would appear due to the construction of the GERD on the population at a national as well as at on an international level; and
- Secondly, to propose a framework with adapted mechanisms for settling potential conflicts on water resources in the Nile River Basin.

The first aspect of the thesis was achieved and it was found that, indeed, the construction of the GERD on the Blue Nile will affect the population at a local and international level.

In fact, the possible impacts on the population arising from the construction of the GERD project were defined in the second chapter. Further, the GERD project will have a direct impact on the environment and contribute to several changes to the region, such as the destruction of terrestrial ecosystems and biodiversity resulting from the inundation of 1,800 square kilometers of land; the decrease in the quality of crops due to lower silt transportation downstream; the deterioration of water quality and the aquatic ecosystems resulting from changes in the flow regimes of the river. These changes are going to affect the population of the Nile River Basin, especially in presence of a variety of ethnic groups, which livelihoods dependent mainly on agriculture, fisheries, and livestock rearing.

Therefore, the impact due to the GERD project on the livelihoods of those different indigenous ethnic groups is very likely to emerge as ethnic conflicts.

The second aspect of the thesis was met as well, by establishing a series of recommendations as a means on settling potential conflicts on water resources in the Nile River Basin.

The first four recommendations proposed should be implemented to cope with the influence of the GERD at a local level and, thereby, prevent ethnic conflicts between the indigenous groups of the Benishangul-Gumuz Region.

The first and the second recommendations state that a thorough ESIA should be conducted on the GERD project and resettlement development programs need to be established and implemented. Indeed that will permit the local population to better prepare themselves to the changes caused by the GERD project and give them the opportunity to choose the appropriate resettlement location considering their livelihood needs.

Furthermore, the risk of impoverishment of the displaced population needs to be assessed (recommendation 3) as to prevent tensions and conflicts between hosts and resettlers. Another way to cope with the issues between hosts and resettlers is to integrate the host communities in the resettlement development programs (recommendation 4). Indeed, the implementation of the recommendations 3 and 4 will benefit for a peaceful environment among the host communities and the resettlers, and thereby avoid the reproduction of past conflicts such as the confrontation between the Sudanese Nubians and the Shukriya over arable land.

The last seven recommendations proposed should be implemented to deal with the influence of the GERD at an international level.

Indeed, the recommendations mainly argue that ethnic conflicts in the Nile River Basin can be prevented by increasing transboundary coordination. To do so, the Nile River Basin needs to improve institutional capacity by carrying out the creation of the Nile River Basin Commission (recommendation 7), the establishment of sub-basin legal frameworks (recommendation 8), and the establishment of basin-wide integrated management strategies (recommendation 11).

5.2. Final Conclusion

To conclude, the GERD project will have an important influence on the future of many people living close to the Nile River and the population will be affected through environmental and socio-economic changes. However, by implementing the following recommendations, potential conflicts on water resources in the Nile River Basin can be prevented.

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APPENDIX 1: DEFINITIONS

Saddle Dam: A subsidiary dam of any type that is constructed across a saddle or low point on the perimeter of a reservoir.

Spillway: A structure over or through which flood flows are discharged. If the flow is controlled by gates, it is a controlled spillway; if the elevation of the spillway crest is the only control, it is an uncontrolled spillway.

Sluice: An artificial channel for conducting water, which is often fitted with a gate (sluice gate) at the upper end for regulating the flow.

APPENDIX 2: COOPERATIVE FRAMEWORK AGREEMENT

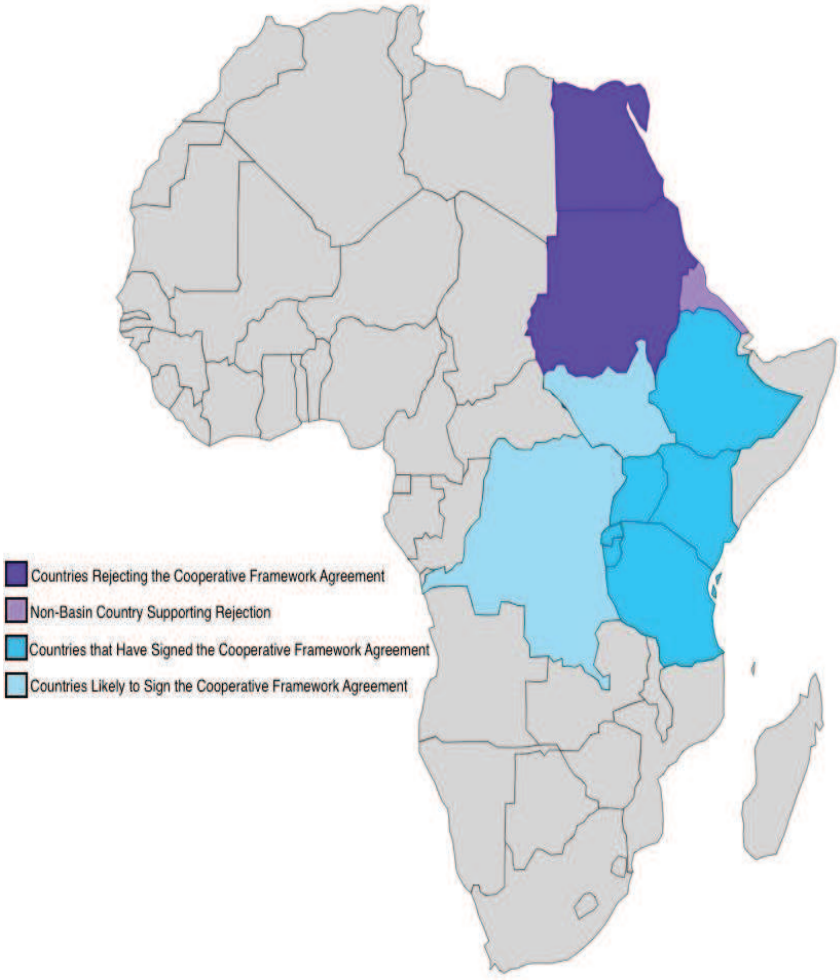

FIGURE 5: RIPARIAN STATES AND THE CFA

Source: (Lewis, 2013)

APPENDIX 3: INFRASTRUCTURE IN THE NILE BASIN

TABLE 8: DAMS IN THE NILE BASIN

Dam	Height (m)	Capacity (bcm)	Purpose	Operation Start
Assiut Barrage	16	NA	Irrigation, Navigation	1902
Esna Barrage	16	NA	Irrigation, Navigation	1908
High Aswan Dam	111	162	Irrigation, Flood Control, Hydropower	1970
Nag-Hamady Barrage	16	NA	Irrigation, Navigation	1930
Old Aswan Dam	53	5	Irrigation, Hydropower	1933
Lake Tana	1	3,5	Hydropower	
Jebel Aulia	22	3,5	Irrigation, Hydropower	1937
Khashm El Gibra	35	1,3	Irrigation, Hydropower	1964
Roseires	60	3	Irrigation, Hydropower	1966
Sennar	48	1	Irrigation, Hydropower	1925
Bujagali		NA	Hydropower	
Owen Falls	30	230	Irrigation, Hydropower	1954

Source: (FAO, 2014)

NA Not Available

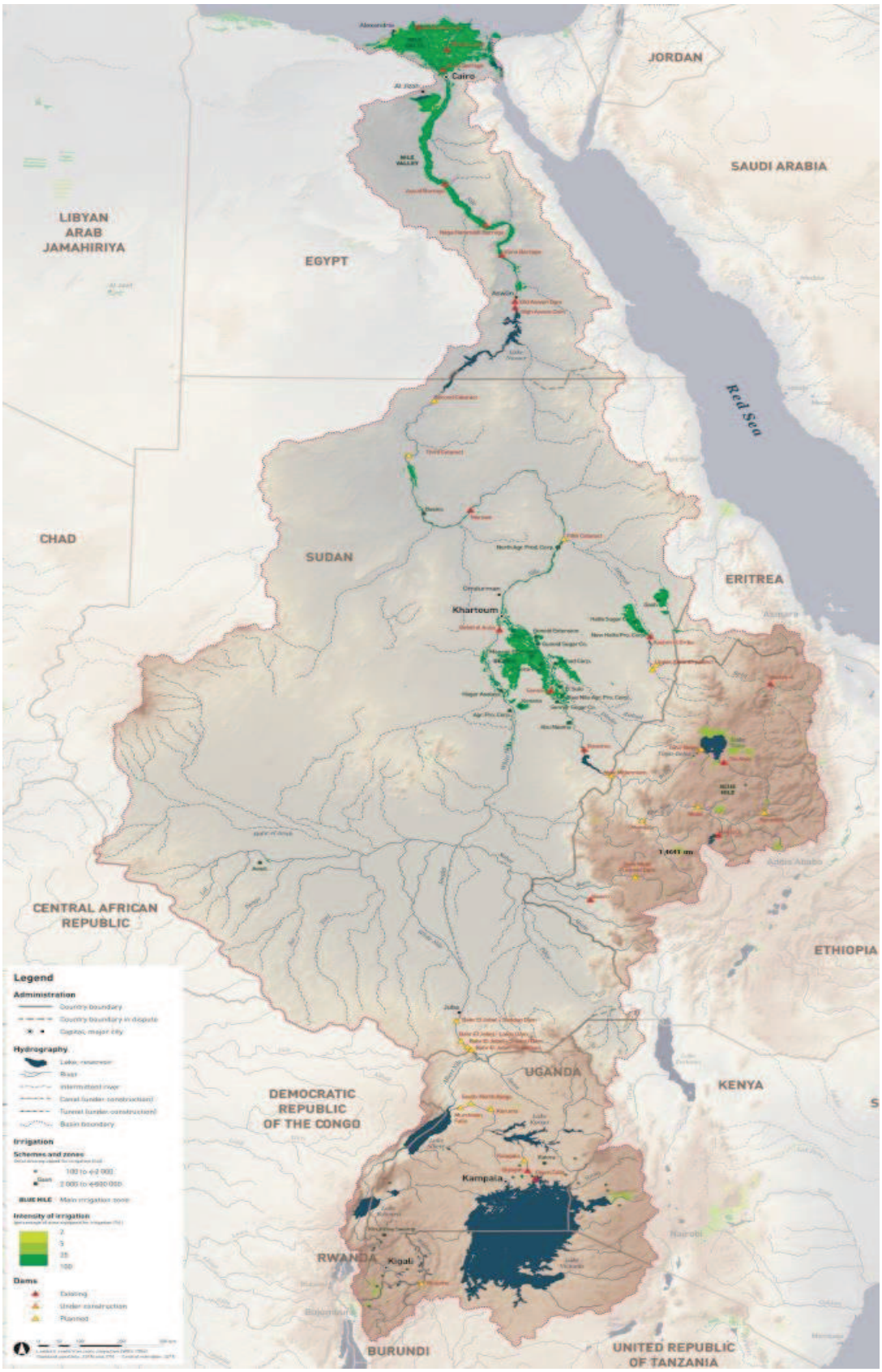

FIGURE 6: EXISTING AND PROPOSED DAMS AND MAIN IRRIGATION AREAS

Source: (FAO, 2014)

APPENDIX 4: THE NILE BASIN INITIATIVE

TABLE 9: INSTITUTES ACTING IN THE NILE BASIN INITIATIVE

Country	Nile-COM	Focal Points for the SVP
Burundi	Ministry of Land Management, Environment and Tourism	Ministry of Land Management, Environment and Tourism
DRC	Ministry of Environment, Nature Conservation, Water and Forests	Ministry of Environment, Nature Conservation, Water and Forests
Egypt	Minister of Water Resources and Irrigation	Egyptian Environmental Affairs Agency
Eritrea		Eritrea Agency for the Environment
Ethiopia	Ministry of Water Resources	Environment Protection Authority
Kenya	Ministry of Water Resources Management and Development	Ministry of Environment and Natural Resources
Rwanda	Ministry of Lands, Environment, Forestry, Water and Natural Resources	Ministry of Energy, Water and Natural Resources
Sudan	Ministry of Irrigation and Water Resources	Higher Council of Environment and Natural Resources
Tanzania	Ministry of Water and Livestock Development	National Environment Management Council
Uganda	Ministry of Water, Lands and Environment	Ministry of Water, Lands and Environment

Source: (Timmerman, 2005)

APPENDIX 5: THE IMPOVERISHMENT RISK AND RECONSTRUCTION MODEL

The Impoverishment Risk and Reconstruction (IRR) model (Cernea, 2013) has been formulated and developed in the 1990s by Cernea who is a Research Professor of Anthropology and International Relations at George Washington University. This model was determined for displacement induced by development programs. In fact, the IRR model concentrates on the social and economic aspects that are related to involuntary resettlements as well as the rehabilitation of the internal displaced peoples (IDPs).

Cernea explains throughout the IRR model that internal displacement elevates the risk of impoverishment and that IDPs are most likely to face the loss of natural capital, human-made physical capital, human capital and social capital. He defines nine risks that induce impoverishment of people affected by displacement, that is, landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity and mortality, loss of access to common property and education opportunities. Cernea proposes in the model to *"target […] risk reversal"* as a way to diminish and overcome the phenomenon of impoverishment. Thus:

- Landlessness would have to be reversed by 'land-based resettlement' permitting access to land after the displacement and a temporary use of land during the relocation period;
- Joblessness would be reversed by 'reemployment' after the displacement and if possible a temporary employment during the relocation period;
- Homelessness would be reversed by 'house construction' resulting in permanent housing after the displacement and temporary shelter during the relocation period;
- Marginalization by 'social inclusion' during and after displacement;
- Increased morbidity by 'improved health care' during and after displacement;
- Food security by 'adequate nutrition' during and after displacement;
- Loss of access by 'restoration of community assets and services' such as education for instance; and

- Social disarticulation by ‘networks and community rebuilding’ during and after displacement (Cernea, 2013).

According to Cernea, several studies applied the IRR model as a basis and lead to promising results. For example, he states that the Institute for Socioeconomic Development (ISED) in Orissa, India, has used the model to explore relocation processes caused by development projects such as dam construction, thermal plants, mining and industry.

APPENDIX 6: BASIN AND SUB-BASIN IN THE NILE RIVER BASIN

FIGURE 7: BASIN AND SUB-BASIN DELINEATION IN THE NILE RIVER BASIN

Source:(FAO, 2014)