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The Win-Win-Win Scenario in the Blue Nile's Hydropolitical Game: Application on the Grand Ethiopian Renaissance Dam

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ABSTRACT

The paper discusses in-depth the hydropolitical conflict in the Blue Nile seeking for a win-win-win scenario for the three co-basin countries, Ethiopia, Sudan and Egypt.

The study overviews the hydrological, legal and political contexts of the conflict in the Blue Nile Basin. Giving more focus on the Grand Ethiopian Renaissance Dam (GERD), a comprehensive analysis is processed for the consequent steps were taken by the three countries since the pre-feasibility phase until the date of writing this paper, March 2014. A SWOT analysis is processed to scan the strengths and weaknesses of the basin, in addition to opportunities and threats of constructing hydrological projects in the upper state. The analysis aims to define the expected scenarios of the hydropolitical game. The win status for the three countries could not be achieved in unilateral decision-making process, but through a concrete integrative cooperative framework. This institutionalized good transboundary water governance is the only way to implement development plans, prevent harms, and ensure water security of states.

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KEYWORDS

Hydropolitical game, Renaissance Dam, transboundary water governance, SWOT analysis, win-win-win scenario.

1. INTRODUCTION

60% of global fresh water[1] is shared between two or more countries, resulting in 263-plus transboundary lake and river basins covering around one-half of the earth's total land surface. 145 countries (90% of the world's population) share transboundary basins, while 40% lives within the borders of these basins. In addition, about 2 billion people worldwide rely on groundwater that includes around 300 transboundary aquifers (UN-Water, 2008, p. 3).

Within a country, different challenges arise in the processes of water governance from intra-household level to national one. These challenges begin with water management within household activities and issues of equity between men, women and children in rights and responsibilities (Lele, Klousia-Marquis, & Goswami, 2013, p. 48). Many sectors nation-wide, as well, are concerned with governing water resources that fuel various social, economic and spiritual activities, unlike other scarce consumable resources. This fact imposes complex multiplicity of stakeholders and competing objectives in such process (Wolf, 2007, p. 3.5), where implementing the fundamental principles of good governance (rule of law, participation, transparency, accountability, etc.) is the key-way to success (UNDP, 1994).

When coming to the international level, complexity of shared water governance is exacerbated exponentially, where those principles of good governance nearly become impossible idealism. Even more than 400 international treaties apply to different aspects and forms of transboundary waters worldwide (Wouters, 2013, p. 18), in addition to 28 UN agencies, regional commissions and non-UN organizations and programmes working on 13 different overlapping water related programmes, riparian states are always unwilling to internationalize dispute management in most cases (Lele, Klousia-Marquis, & Goswami, 2013).

Therefore, the question, discussed in literature by various forms, is "Will these treaties come into force and will they make a difference to global water governance when there are strong and weak states? Should we focus on sharing water resources or on sharing the benefits which result from there effective collective management (benefits which can arise from good collective governance with transparent accountability)?" (Lele, Klousia-Marquis, & Goswami, 2013, p. 57). Growing tension between ‘national sovereignty’ and ‘interests’ of riparian states made it more complex till now to have a ‘supra-national authority’ with jurisdiction over transboundary disputes.

Because of these serious complications of transboundary water governance, two basic theses in hydropolitics are distinguished (Schmeier, 2010, p. 5):

- Neo-realism or Malthusian approach that focuses on conflictive potential and ‘water wars’ possibilities between co-basin countries;
- Institutionalism or Cornucopian branch that focuses on cooperative potential[2] between riparian states through the principle of ‘sharing benefits’.

[1] 2.5% of the world's water (covering 70% of our earth's surface) is fresh water. Though, about 69% of this fresh water is frozen in the icecaps of the north and south poles, 30% is deep underground water, and less than 1% is accessible water in rivers, lakes, soil moisture and shallow groundwater (Gleik, 2000, p. 21).

[2] The Transboundary Freshwaters Disputes Database (TFDD) at Oregon State University conducted a project entitled "Basins At Risk (BAR)", The study worked on the international rivers between 1948 to 1999, analyzing the

Among the international rivers around the world, the Nile Basin is considered a hotspot[3], specially for the Eastern Nile countries (Yoffe, Wolf, & Giordano, 2003). 85-90% of the Nile waters originate from the Ethiopian Highlands. Egypt is a hot arid country vitally relying on the Nile, while Ethiopia has various plans to utilize the Blue Nile. Sudan, as well, is changing its historical unified situation with Egypt seeking for its national interests. The three countries are facing severe challenges in a dramatically changing time. Populations are growing rapidly, and their demands for water, energy and food are increasing exponentially, while climate is changing unexpectedly.

The hydropolitical game in the Blue Nile Basin has been significantly affected by the unilateral decision of Ethiopia in April 2011 to construct the GERD without taking a prior approval from Egypt or even holding preparatory discussions. The consequent internal political instabilities in Egypt, since January 2011 to date, influenced its reactive management of the conflict. On the other hand, Sudan announced its support to the project.

The paper discusses the hydrological, legal and political contexts of the conflict in sections 3 and 4, and then gives special focus on the GERD story in sections 5 and 6. SWOT analysis is processed in section 7 based on data and studies illustrated in previous sections. Finally, the section presents the probability of achieving a win-win-win scenario for the three countries.

2. METHODOLOGY

2.1 Hydropolitical Game

Hydropolitics could be studied in the perspective of 'game theory', where riparian states represent the players, and the way they share the common ecosystem defines the status of each one in the game (win or lose), as shown in table 1. States act based on its national interests, whether unilaterally or through a coalition. States sometimes choose noncooperation status, as they prefer sub-coalitional or even unidirectional arrangements than being involved in a grand coalition with much effort to balance all interests of riparian states and expected costs in case of weak institution managing the common pool (Dinar & Nigatu, 2013, p. 2). However, non-cooperation costs are much expensive. Beside environmental health deterioration and water quantity/quality problems, the political tensions lasting for years or even decades are considered the most serious threats of non-cooperation trends (Wolf, 2007, p. 3.8).

The probable scenarios of the hydropolitical game in the Blue Nile cannot be limited between two sides with four probabilities (win-win, win-lose, lose-win or lose-lose) similar to what happened in the past where Egypt and Sudan form one coalition. Recently, the three countries are moving freely out of historical considerations. Consequently, the win-win-win scenario became a more complicated goal that Ethiopia, Sudan and Egypt should negotiate.

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tendency of basins to be cooperative or conflictive. 78% were found to be cooperative in nature, while 5% are neutral, and 17% are conflictive (Yoffe, Wolf, & Giordano, 2003, p. 1112).

[3] The Nile is listed in the 'hotspots' category of basins that might witness future conflict due to the absence of one basin-wide treaty involving all riparian states (Yoffe, Wolf, & Giordano, 2003, p. 1121).

Table 1. The players in the hydropolitical game.

Players		Probabilities	Challenges
G_1	1	2	Within one country, managing various sectors, fueling their activities by water, relies on the level of its good governance to define its 'win' or 'lose' status.
G_1 G_2	2	4	If two countries are sharing a common river, their cooperative or conflictive management of transboundary water defines four scenarios (W-W, W-L, L-W or L-L).
G_1 G_2 G_3	3	8	Increasing the number of hydropolitical game, sharing a transboundary river, makes governance more complicated, where each state prioritizes its national interests and exercises its political power, specially in the absence of strong water international law and institutions.

2.2 SWOT Analysis

The SWOT analysis[4] is a classical method used to assess plans and projects. It is a matrix analyzes of the strengths, weaknesses, opportunities and threats of the issue under study.

The paper uses the SWOT analysis to study the strengths and weaknesses of the Blue Nile Basin, then the opportunities and threats of constructing hydrological projects on the Blue Nile, giving special focus on the Grand Ethiopian Renaissance Dam.

Based on the analysis, the paper illustrates various prospective scenarios of the hydropolitical game in the basin. Scenarios are determined according to the decisions of the three countries whether to manage their development plans cooperatively or unilaterally, and consequently maximize or diminish the opportunities and threats.

3. OVERVIEW ON THE NILE

3.1 Water Resources

The Nile, the worldwide longest river by most accounts, flows through eleven countries along 6,695 km. The total surface area of its basin is 3.18 million km2, covering 10% of Africa's land. The combined runoff water coefficient of the Nile is 3.9%, which is very low compared to other rivers (NBI, 2012, pp. 28, 30).

The Nile comprises a group of tributaries. The White Nile, which contributes to 14% of the average annual water runoff of the Nile, is mainly produced in the Equatorial Lakes Plateau (Victoria, Kyoga and

[4] The SWOT analysis is developed at Stanford Research Institute (SRI) by Robert Stewarts and Albert Humphrey in the 1960s through the project of Fortune 500 companies to address their effectiveness. The method exceeded the limit of utilization in business, but has been widely used in planning and reformation programs of projects, plans and institutions (ISU, 2006).

Albert Lakes). While, 86% originates from the Lofty Ethiopian Highlands: 59% through the Blue Nile (Abay), 14% Baro-Akobo (Sobat), and 13% Tekesse (Atbara) (Swain, 1997, p. 675).

The White and Blue Nile rivers converge in Khartoum. The combined rivers are then joined by the Atbara to form the Main Nile that flows northwards. It eventually discharges into the Mediterranean Sea through its Delta (NBI, 2012, p. 29).

Figure 1. Annual runoffs of sub-basins in the Nile (NBI, 2012, p. 39).

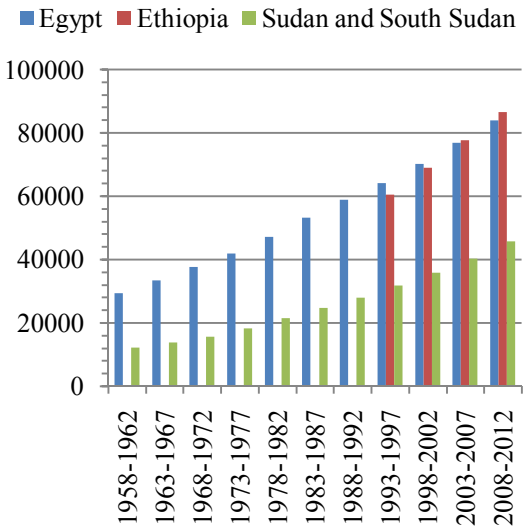


Figure 2. Total population (1000 inhabitant) (FAO, 2013). Data for Ethiopia is available since 1993-1997.

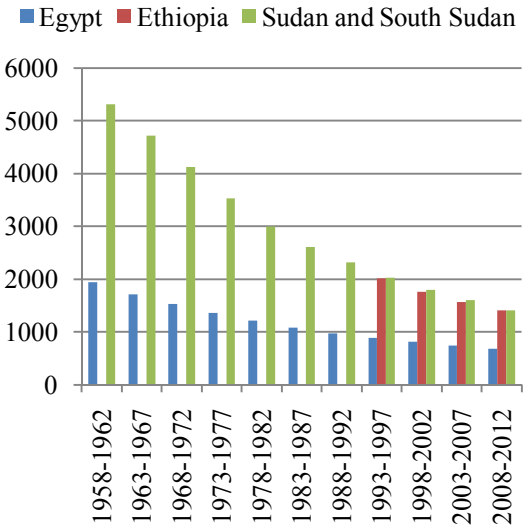


Figure 3. Total renewable water resources (produced internally and outside borders) per capita (m^3/inhabitant/yr) (FAO, 2013). Data for Ethiopia is available since 1993-1997.

Rainfall over the basin is characterized by highly uneven seasonal and spatial distribution, where precipitation reliability and volume decline moving northwards with peak values in summer months (NBI, 2012, p. 31). According to FAO, 2013, the average annual rainfall precipitations in 2011 for Ethiopia, Sudan/South Soudan, and Egypt are 848, 416 and 51 mm/yr respectively. While the total renewable internal water resources (surface and ground water) of Ethiopia are 122 BCM/yr of which 53 BCM/yr are exploitable. 97% of Egypt's total annual water resources are produced outside its borders of which 85-90% originate in Ethiopia. Most of Egyptians reside around 3.6% of the country's area that is the total cultivated area until 2011 (FAO, 2013). Relative to the rainfall pattern, the annual recharge rate of groundwater aquifers declines significantly moving northwards, where the renewable portions of annual groundwater in Egypt, Ethiopia and Sudan are 2%, 76% and 26% respectively (Hassan, Attia, & El-Attfy, 2004) .

The aridity of the downstream country and its full dependency on upper states in its water security define one of the main complications in the basin.

3.2 Population

The total population residing in the Nile Basin was 238 million until 2012. Those represented 54% of the combined population of the eleven riparian states (437 million) that is expected to be 648 million by 2030. The basin countries are under developed countries[5]. About 72% of the basin population lives in rural areas. The average urban population growth is 4-5%. Although rural population growth rates will be in negative by 2050, the substantial portion of population will remain in rural areas, except for Egypt and Sudan (NBI, 2012, pp. 100, 105, 113).

The Egyptian rapidly growing population is mainly concentrated in the Nile Valley and Delta, leaving the vast areas of deserts (95% of Egypt's total land area) unlivable. High dense urban expansions, desertification process, and soil erosion due to the High Aswan Dam impacts are putting heavy burdens on the ecosystems reducing available arable lands.

About 40% of Ethiopian population lives in the country's lowlands, around the four western basins in Ethiopia (Blue Nile, Baro-Akobo, Oma-Ghibe and Tekeze), where 85% of Ethiopia's water resources are available. The majority of population lives in the highlands where climatic conditions are more preferable though water availability is lower (Negash, 2012, pp. 8, 9).

4. LEGAL AND POLITICAL CONTEXT

4.1 Treaties and Agreements

Along the 20th century, several bilateral and trilateral agreements have been signed regarding the water allocation and use in the Nile as shown in table A.1. In the British colonial era, Britain managed much effort to protect its interests in the downstream water, supporting what Egypt advocates to be its historic and natural rights for the Nile River being its only source of water. The 1902 and 1929 agreements

[5] According to the HDI report in 2011, ten of them were placed in the 'low human development' category, eight of which are among the bottom 25, while Egypt was counted in the 'medium human development' group. The Human Development Index (HDI) is a score calculated by the UNDP based on life expectancy, education and income per capita (UNDP, 2011, p. 126).

provided Egypt the right of prior approval of any construction works on the Nile in the upstream countries (Degefu, 2003, pp. 93-140) and (Brunnee & Toope, 2002, pp. 122-126).

After the independence of Egypt and Sudan, both signed a treaty in 1959 reviewing previous ones. The treaty allocated 55.5 BCM and 18.5 BCM of the Nile waters to Egypt and Sudan respectively, instead of 48 BCM and 4 BCM stated in the 1929 exchange of notes (Carlson, 2013).

Most of other riparian states, specially Ethiopia, rejected the constraints imposed through these agreements. On the other hand, Egypt argues the validity of these historic agreements in light of the international law principal of state succession. Nile cooperation efforts became more complicated through various regional tensions, as the long history of distrust between Egypt and Ethiopia, border disputes (Egypt and Sudan as well as Eritrea and Ethiopia), in addition to the separation of Sudan and South Sudan and the civil war in the later (Brunnee & Toope, 2002, pp. 122-126) and (Paisley & Henshaw, 2013, p. 63). Egypt, as well, witnessed dramatic political changes after the January 25, 2011 revolution, which affected the power weights in the Nile's hydropolitical game.

4.2 Negotiations Development

Along the last three decades, negotiations between the co-basin countries failed to formulate a 'basin-wide' legal regime. Wide gap between different points of views was obvious along the way, particularly between upper and lower states (Paisley & Henshaw, 2013, pp. 63-67). Main conflict questions arise around the concept of 'national sovereignty' of upstream countries in using the Nile waters. They are not convinced by the principals of 'prior notification', 'consensus' in decision-making, and 'international arbitration' to settle disputes. At the same time, what are seen as 'historical and natural rights' by downstream countries, others name 'hegemony'. All these dramatic disputes are currently embodied in the conflict between Egypt and Ethiopia around the Grand Ethiopian Renaissance Dam (GERD).

Although the Nile Basin Initiative (NBI), led by the World Bank since 1999, succeeded to manage various collaborative technical projects specially for monitoring schemes and data sharing, a clear conflict arose between riparian states while negotiating the Nile Basin Cooperative Framework Agreement (CFA). Egypt and Sudan rejected the agreement because of the ignorance of principles of 'prior notification' and 'recognition of previous treaties', beside the definition of 'water security' (EMFA, 2010).

4.3 International Law

In addition, international law[6] did not help settling these disputes. One reason of its ineffectiveness is that the main conventions, such as the United Nations 1997 and Helsinki 1966 Rules, did not enter into force to date, as they are not yet ratified by the minimum required number of countries (UN, 2014). Second one is the unclear terms used in its articles that cannot be called flexible but misleading in many cases, such as 'equitable' and 'fair' sharing of water, and 'appreciable harms' affecting downstream countries. While these terms are not illustrated in solid executive forms, coming back to negotiations between riparian states would be an inevitable step that is substantially influenced by national political and physical powers as well as international relationships and coalitions (Degefu, 2003, pp. 69-73).

[6] The 1966 Helsinki Rules on the Uses of the Waters of International Rivers by the International Law Association (ILA), and the 1997 Convention on the Law of the Non-Navigational Uses of International Watercourses by the International Law Committee (ILC) of the United Nations (Degefu, 2003, pp. 69-73).

5. THE GRAND ETHIOPIAN RENAISSANCE DAM

5.1 Pre-Feasibility Studies

The Blue Nile Basin study of the United States Bureau of Reclamation (USBR) in 1964 identified four hydropower sites on the Abay River in Ethiopia: Karadobi, Mabil, Mandaya and Border (FDRE-MoWR, 2007a). Border is the most downstream of these sites being very close to the Ethiopian-Sudanese borders.

In 2007, the Africa Development Bank funded a power trade pre-feasibility study conducted by the Eastern Nile Technical Regional Office (ENTRO) for Mandaya and Border projects (NBI-ENTRO, 2007). The pre-feasibility study assessed the environmental, social and economic effectiveness of establishing an inter-connection power grid between the three Eastern Nile countries. The main conclusion of the study was to construct two hydropower projects in Ethiopia (Mandaya and Border) and one in Sudan (Dal), which was found to be the optimum solution to cover the energy demands of the three countries over the upcoming 25 years with no negative impacts on the downstream countries (NBI-ENTRO, 2007, pp. Sec. I: 1, Sec. II: 3).

In May 2011, the Eastern Africa Power Pool (EAPP) and East African Community (EAC) published a comprehensive master plan, involving the Eastern Nile countries, as an attempt to develop a unified power grid code (EAPP & EAC, 2011, pp. Vol. I: 82, 84). As shown in tables 2 and A.2, the plan included Border project among the proposed hydropower plants in Abay River based on the previous pre-feasibility studies of NBI-ENTRO. The plan studied carefully the construction schedule of the large three hydro-plants of Mandaya, Karadobi and Border, with a recommendation of at least 5-year period separating each other, and the lowest priority was given to Border plant (EAPP & EAC, 2011, p. Vol. 1: 199). The proposed capacity of Border dam was 1200 MW (6,331 GWh) with a reservoir of 14 BCM water volume (EAPP & EAC, 2011, pp. App. B-II: 13, 16).

5.2 The Official Commencement

On April 2, 2011, the Late Prime Minister Meles Zenawi celebrated in Guba the official commencement of the construction of the Millennium Hydroelectric Project. He delivered a speech acknowledging the Ethiopian people and clarifying the massive benefits of the dam for their countries and neighbors. A very significant wording in this day was the following (GCAO, 2012):

"Before we mobilized our efforts to eradicate poverty, centuries of impoverishment curtailed our development and restricted us from exercising our right to use the resources of our own rivers. Now, thanks to the dedication of our peoples, we have safely put those times behind us. We are close to opening a new chapter through the realization of our Millennium project. Henceforward, nothing can stop us from exercising our rights; the other dams we plan to build are less challenging than this, the Millennium Dam."

In addition, Zenawi said the project would cost 3.3 billion EUR (4.78 billion USD). He called all Ethiopians, even those very poor, to provide sacrifices to domestically-fund the project. This "difficult choice", as he said, was due to blocking international fund opportunities.

Reuters News asked Alemayehu Tegenu, Ethiopia's Water Minister, if Ethiopia officially informed Egypt prior to the project's commencement. He answered, "No they found out from the media". He said,

"Ethiopia did not inform Egypt it planned to build a huge dam on the Nile and the two countries have not discussed the issue despite fears a dispute over the river could spark war". He added, "Ethiopia would not agree to an Egyptian request to see plans for the dam" unless Egypt joined the six countries that had signed the Nile Basin's Cooperative Framework Agreement (CFA). He explained that Ethiopia took this situation after 10 years of fruitless talks to re-negotiate the colonial era treaties (Malone, 2011).

The Border Dam aimed originally to generate 1200 MW with water reservoir of 14 BCM volume, as suggested by the USBR study then assessed through the NBI and EAPP (EAPP & EAC, 2011) and (NBI-ENTRO, 2007). Then, the Millennium Dam, as introduced by Zenawi, was of 5250 MW generated electricity and 67 BCM reservoir volume (GCAO, 2012). Afterwards, the Ethiopian Energy Production Co. announced the new name of the Grand Ethiopian Renaissance Dam (GERD) with its modified specifications for 6000 MW electricity and 74 BCM reservoir (EEPCo, 2013).

Figure 4. The location of proposed hydropower projects and power grid in Ethiopia and Sudan (NBI-ENTRO, 2007, p. Sec. II: 2).

5.3 International Panel of Experts

5.3.1 Formation of the IPoE

In a very critical instable moment of the January 25, 2011 revolution, Egypt received the news of Ethiopia's unilateral decision to construct the Millennium Mega Dam with its specifications had been enlarged over that were negotiated in the pre-feasibility studies without a prior notification.

Later Prime Ministers of Ethiopia and Egypt, Meles Zenawi and Essam Sharaf, agreed in May 2011 on forming an international panel of experts (IPoE) to assess the design and construction documents of the dam. The panel comprised two experts from each country (Ethiopia, Sudan and Egypt) in addition to four neutral international experts. The three governments provided the panel access to available documents besides conducting field study to the construction site. The panel was left for one year (from May 2012 to May 2013) to submit its final report. The two principles, which the panel was built on, were that its recommendations are consolatory not mandatory and its work would not stop the construction progress but to be held in parallel.

5.3.2 Recommendations of the IPoE

The full-text of the final report of IPoE is not publicly published to date. However, a copy "verified by Ethiopia's Foreign Ministry" was emailed to Bloomberg News (Davison, 2013) that reported on October 3rd, 2013, by W. Davison, the following conclusions:

- “Structural measures might be needed to stabilize the foundation to achieve the required safety against sliding” of the main dam;
- The “weak zones” in the rock that will support an auxiliary dam needs to be studied;
- In case of filling the reservoir during dry years, it would “significantly impact on water supply to Egypt and cause the loss of power generation at High Aswan Dam for extended periods”, while if it is filled in years of average or high rainfall, 6% reduction in the High Aswan Dam generated electricity will occur with no significant loss in water volume received there;
- “The analysis presented is very basic, and not yet at a level of detail, sophistication and reliability that would befit a development of this magnitude, importance and with such regional impact”. Accordingly, the panel stated that a "comprehensive" additional study of the dam's impacts should be conducted;

The Egyptian Ministry of Foreign Affairs stated that the summarized recommendations of the IPoE's final report are oriented to Ethiopia in order to update the dam's structural and hydrological studies, as the documents sent to the panel were basic and incomplete (ESIS, 2013). While, Ethiopia, on the other hand, insisted on the fact that the report showed that the dam is constructed according to the international standards and there are no negative impacts or significant harms on the downstream countries but even it will bring benefits (NCCPPC-GERD, 2013). Accordingly, Ethiopia decided to continue the construction work after diverting the Blue Nile, and in parallel updating the required studies that are not vital but complementary in its own point of view (FDRE-MFA, 2013).

Table 2. The dams proposed in the pre-feasibility studies and listed in the final master plan of Eastern Africa power grid (EAPP & EAC, 2011).

Plant	Source	MW	FSL (m)	Dam height (m)	Tail-water (m)	Storage (m^3 x 10^6)
Karadobi 2006	MoWR	1,600	1,146	250	910	40,200
Beko Abo 2007	MoWR	2,100	906	110	795	37,500
Beko Abo	ENTRO	1,000	906	110	795	
Mabil	USBR	1,200	906	171	740	13,600
Mandaya	USBR	1,620	741	164	580	15,930
Mandaya 2007	ENTRO	2,000	800	200	605	49,200
Border 2007	ENTRO	1,200	580	90	490	14,470

5.3.3 Following-Up Actions of the IPoE's Report

The Foreign Ministers of Ethiopia and Egypt met on June 18, 2013, to determine the follow-up activities of the international panel. They agreed on holding a series of discussions between the three countries' Foreign Ministers in order to define the mechanisms of implementing the panel's recommendations.

Khartoum, the Sudanese capital, hosted three consequent meetings between the Water Ministers of the three countries from November 2013 to January 2014. Fekahmed Negash, the director of Boundary and Transboundary Rivers Affairs at the Ethiopian Water Ministry, told the Official Ethiopian Press Agency (HAILU, 2014) that the discussions focused mainly on forming a new committee to follow-up the implementation of the IPoE's recommendations. According to Negash, the Ethiopian delegation 'automatically' rejected a group of the Egyptians' proposals during the discussions series because it would "harm the national interests, sovereignty and development of Ethiopia". These proposals, as mentioned by Negash, were as follow:

- Either to include international experts in this committee beside the experts from the three countries, or to add the previous IPoE's members to the new committee;
- To give the committee the right to follow-up the construction works of the dam;
- To let the committee prepare various alternatives and take actions based on them;
- To consider the committee and consulting organizations accountable for the three countries;
- To form a parallel-panel of international experts to conduct the main recommended studies by the IPoE, which include hydrological simulation model in addition to transboundary social, economic and environmental assessment;
- To agree on a document stating the "Principles of Confidence Building" to secure the Egyptian watercourse of the Nile and harms prevention of the project.

The main reasons of the Ethiopian rejections were, as clarified by Negash (HAILU, 2014), that the Ethiopian government found no need to internationalize the new committee or describe its decisions as obligatory. He said the recommended studies of the IPoE would be accomplished by Ethiopia. About the

last request, he said it was not relevant to the IPoE's recommendation, while it should be discussed with other riparian states of the Nile Basin in respect of the Cooperative Framework Agreement.

Accordingly, the discussions were terminated without achieving any effective solutions. Moreover, the Egyptian and Ethiopian Water Ministers held another meeting in Addis, the Ethiopian capital, but it was fruitless as well.

5.4 The Recent Scene

5.4.1 The Ethiopian Situation

On March 12, 2014, Zadig Abraha, Head of the Project's Supervisory Committee, told World Bulletin News Desk that the Grand Ethiopian Renaissance Dam would start producing electricity of 750 MW by September 2015 (within 18 months). The project, according to Abraha, will yield annual revenues of some 2 billion USD because of exporting power to neighbors, such as Sudan, South Sudan, Kenya, Djibouti and Yemen. He added that revenues would even increase as the electricity production increases (World Bulletin, 2014).

Prime Minister Hailemariam Desalegn said, during his meeting with local and foreign journalists on February 10, 2014 (FDRE-MFA, 2014), "Ethiopia and Egypt had no other option except dialogue and negotiation to provide a win-win solution over the Grand Ethiopian Renaissance Dam project". He clarified that both Ethiopia and Sudan rejected Egypt's request to form a new international experts panel, and added that "the Ethiopian government’s stand over the Dam remained the same as before, and that the construction of the GERD would continue as planned". Answering a question about probabilities of Egypt's attempts to internationalize the issue, the Prime Minister said, "there was no international court responsible for investigation or judgment on water issues and such a move could have no result".

At the same time, Ethiopian officials repeated several times that the Renaissance Dam would not harm Egypt and Sudan, as the project would cause slight detour in the water flow but "never have any effect of the amount of water flowing downstream", where there would be no reduction in the water volume reaching Egypt (FDRE-MFA, 2013). The Ethiopian Water Minister asserted that the dam would not affect the Nile watercourses of Egypt and Sudan (Aljazeera, 2014).

5.4.2 Sudan's Situation

During the inauguration of the power linkage network between Sudan and Ethiopia on December 4, 2013, in Gedaref state, the Sudanese President, Omer Al-Bashir, said that his country's approval on the construction of the Renaissance Dam is due to economic not political reasons. He clarified that Sudan will benefit directly from the electricity generated by the Ethiopian dam and indirectly through raising the power generation capacity of Sudanese hydropower projects after the construction of the dam. The Sudanese President signed with the Ethiopian Prime Minister an agreement to strengthen ties between the two countries through the establishment of railways projects and free trade zones (Sudan Tribune, 2013) and (Al-Haj, 2013).

On February 18, 2014, Ali Karti, Foreign Minister of Sudan, confirmed that his country is neither taking sides with Egypt nor Ethiopia in the dispute. He said Khartoum would continue its efforts to bridge the gap between the two countries (Sudan Tribune, 2014).

5.4.3 Egyptian Situation

Egyptian officials insist on their full respect to the Ethiopian right in development, but without causing harms to other countries. Egypt asserted, in many occasions, that the decision of constructing dams on international rivers is not an independent sovereign right of the upstream country, but should be discussed and assessed with the downstream countries (Shetewy, 2013, p. 30).

Nabil Fahmy, the Egyptian Foreign Minister, said, "Egypt relies on Nile water for more than 95% of its annual needs of water, which makes the Nile River the only lifeline for Egypt, unlike the rest of the Nile Basin countries". He added that cooperation between riparian states is a necessity in order to ensure mutual benefits and maintain water security of all countries. This cannot be achieved through imposing unilateral perspective of upstream countries on downstream ones (ESIS, 2014).

Adli Mansour, the Egyptian President, said that there certainly exist other harmless alternatives rather than constructing mega dams on the Blue Nile in order to produce electricity, where other engineering systems should be studied (ESIS, 2013).

After the termination of the recent tripartite discussions, Mohammed Abdel-Moteleb, the Egyptian Minister of Water Resources and Irrigation, said that his country is planning to contact international institutions and organizations. This would be "with the aim of bringing Ethiopia back to the negotiating table to reach a conciliatory solution that serves development in Ethiopia and makes no damage to Egypt's water share" (ESIS, 2014).

6. EXPECTED BENEFITS AND RISKS

Ethiopian government announced several benefits of the Renaissance Dam, not only for Ethiopia but Egypt and Sudan as well (FDRE-MoWR, 2013). At the same time, research studies, from several perspectives, were recently conducted to explore the risks of constructing such a mega dam on the Blue Nile. Ecologists, sociologists, hydrologists and engineers are always keen on finding balanced solutions that fulfill development plans on one hand without injuring ecosystems and causing negative socio-economic impacts on the other one.

These fears of expected risks are associated with the IPoE's recommendations to conduct further studies of structural design, hydrological model simulation, and transboundary social, economic and environmental assessment of the Renaissance Dam (Davison, 2013). However, Ethiopia commented on these recommendations that they would update the required studies by their means without halting the project (FDRE-MFA, 2013).

6.1 Potential Benefits

6.1.1 Benefits for Ethiopia

The Renaissance dam is considered a mega national project for Ethiopians. The dam aims at providing a wide range of benefits to Ethiopia, as follow (EEPCo, 2013):

- The hydropower plant would cover the severe energy shortages of the national grid that are increasing rapidly year after year;

- The generated electricity would be sufficient for export to neighboring countries, which brings annual revenues to the government;
- The dam's reservoir (surface area of 1,680 km^2 and 15 m depth) would create fishery development, in addition to exploiting aquatic and terrestrial fauna resources;
- The construction works of the dam and power grid would provide new employment opportunities and business investments;
- These electric and economic benefits would pave the way for Ethiopia to implement its ambitious development plans.

6.1.2 Benefits for Sudan and Egypt

Ethiopia introduced the Renaissance Dam as a regional project emphasizing cooperative relations between the three co-basin countries of the Blue Nile. The expected advantages for the downstream countries, as listed by the Ethiopian government, are as follow (FDRE-MoWR, 2013):

- The main aim of the dam is hydropower generation of electricity, which is a non-consumable utilization of water, where the project will not consume water in irrigated agriculture for instance;
- The dam would save amounts of water to the system due to the low evaporation rates of the project's site and reducing water losses of floods;
- The dam would regulate the water flow of the Blue Nile around the year, which brings a group of benefits to the downstream countries, specially for Sudan, as floods protection, irrigation expansion, reducing reservoirs' siltation, and securing water storages for years of droughts;
- The dam would provide more opportunities of navigational uses of the river due to the constant regulated water flow all over the year, which brings commercial and touristic benefits;
- After establishing the inter-connection grid between the three countries in addition to the existing one between Ethiopia and Sudan, low-cost and clean energy would be available for all of them. Beside, the proposed grid would foster mix plans of alternative energies.

6.2 Fears of Risks

6.2.1 Risks on Sudan and Egypt

Jeuland & Whittington, 2013, simulated real options of various infrastructure investments utilizing water resources of the Blue Nile in Ethiopia[7]. The study assessed the economic value of different infrastructure alternatives. It took into consideration the high uncertainties in future of climate change, hydrological systems (rainfall patterns and water flows), in addition to water withdrawal rates in such developing countries of rapidly growing demands. In spite of these variable uncertainties, waiting for more accurate information would be substantially more expensive as assumed by the study. The research results showed the following (Jeuland & Whittington, 2013, pp. 19-22):

[7] The research of Jeuland & Whittington, 2013, was conducted through the Environmental for Development (EfD) Program that is funded by the Swedish International Development Cooperation Agency (SIDA).

- The disadvantages of 'one large dam' alternative are more than that of 'three smaller dams' one;
- The economic value of the first alternative is more vulnerable to expected reductions of water flows and increases of water withdrawals, beside its negative impacts on downstream countries in these cases;
- Resettlement costs of the second one would be less expensive.

Hassan & Kantoush, 2013, developed a hydrological model of the Eastern Nile Basin, including its tributaries, and validated it (Hassan & Kantoush, 2013, pp. 17, 18). Then, Kantoush, 2013, studied the downstream impacts of constructing the Renaissance Dam followed by the other three dams (Beko Abo, Karadobi and Mandaya) that are determined in the Ethiopia's plans (FDRE-MoWR, 2007a) and (FDRE-MoWR, 2007b). The study simulated twenty scenarios of different dams' designs counting various environmental factors. The assessment concluded the following (Kantoush, 2013, pp. 8-11):

- In case of constructing the four dams, the average water flow at the High Aswan Dam would be reduced to maximum 47.9% during years of droughts whether in filling reservoirs or operation phases;
- Reduction of water flows would negatively affect the power generation capacity of the High Aswan Dam, arable lands around the Nile, and salination of the Delta's land and ground water;
- Massive weights of water and sediments in the dams' reservoirs might cause earthquakes that would threaten the dam's structures;
- Catastrophic impacts would occur in downstream countries in case of the structural failure of the Renaissance Dam due to floods of water stored in the reservoir at the borders with Sudan;
- Water quality of the Blue Nile would be negatively affected due to the expected overuse of fertilizers in Sudan after blocking sediments behind the dams;
- Ethiopia should transparently publish the detailed structural and hydrological designs and plans of the Renaissance Dam;
- The three countries should fully cooperate in assessing all expected risks and putting clear policies of sedimentation management, filling reservoirs and dams' operation.

King, 2013, focused on the implications of "filling reservoir policies" on generated hydropower of the dam and negative impacts on people and livelihoods in the downstream countries. Such implications varied according to the simulated filling rates, while assessment becomes more complex accounting climate change uncertainties. The study stressed on the necessity of clear basin-wide water resources management and planning to balance these complicated tradeoffs (King, 2013, pp. 25-28).

Hammond, 2013, spoke about the severe need of all riparian states in the Nile Basin, specially Ethiopia, Sudan and Egypt, for a basin-wide cooperative agreement. While, "the unilateral decision making, represented by the proposed Grand Ethiopian Renaissance Dam cannot provide a fruitful route to future water security for all", as the study concluded (Hammond, 2013, p. 3).

Batisha, 2013, called for special research concern of dam-related landslides and their generated ground failures, which represent common geo-environmental hazards in mountainous terrains. Ethiopia's massive construction works of dams may trigger landslides and slope failures specially for the fragility of Ethiopian mountainous terrains, as the study concluded. Such landslides would cause failures of dams and engineering structures, human death, and land cover deterioration. The study recommended to conduct a

comprehensive multi-disciplinary assessments, prior to dams' construction, supported by field observations, monitoring and geological modeling (Batisha, 2013, pp. 25, 36).

6.2.2 Risks on Ethiopia

Vieulleux, 2013, conducted several interviews with different sectors in Ethiopia as an attempt to measure the expected alteration of human and environmental security dimensions due to the Renaissance Dam. The study understood the huge dam as a one-step in the growth plan of Ethiopia to be a self-sufficient state and exporter of electricity, besides having benefits to downstream countries for floods protection and flow regulation. However, other socio-economic, environmental, cultural and political costs should be also well understood, as concluded by the study in the following points (Veilleux, 2013, pp. 11-13):

- Although resettlement plans of indigenous people would enhance their socio-economic infrastructural services, there exist potential harms of doubling infections of malaria due to concentration of resettled people and availability of water year-round. While currently, the disease is seasonal and attacks the scattered locally spread settlements. Beside, the local communities maybe influenced by the loss of their traditional livelihoods (flood recession farming, gold-panning and fishing);
- The negative impacts on the local dwellers across the borders in Sudan and the level of their adaptation to the expected environmental changes are unknown;
- Environmental problems, as soil erosion and siltation, should be addressed through a basin-wide water planning policies (watershed management, reforestation, availability of bottom gate for sediments in the dam, etc.);
- Being an international river, different scales of alteration should be comprehensively assessed to measure the impacts of the dam on local settlements in Ethiopia, Sudan and Egypt;
- There is also the possibility that the Renaissance Dam "could provoke conflict if basin countries do not work together, if Ethiopia continues to act unilaterally, and if shared benefits are not well understood or recognized";
- Cooperation between the three countries is a must in order to study, assess and prepare scenarios for the dam's implications on socio-economic, environmental and cultural sectors in local, national and regional scales.

Beyene 2011, and WRR, 2013, discussed the economic efficiency of the Ethiopian mega dam. The plant load factor of the dam in its current design (6000 MW/15,768 GWh) is 33%, while it was 60% in the proposed design of the pre-feasibility studies (1200 MW/6,011 GWh). The current system efficiency (0.3) is considered a low value compared to Ethiopian and international standards, and other similar dams in Ethiopia and around the world. These Ethiopian discussions concluded that if the main aim of the dam is to generate electricity, then constructing a smaller dam of a greater efficiency could be economically more efficient and would save much of the Ethiopian domestic investments. Otherwise, there might be other goals behind this huge dam, such as water storage or changing the hydropolitical rules in the region, specially that the topography of the land around the dam's lake is mountainous and not suitable for irrigated agriculture (Beyene, 2011) and (WRR, 2013).

7. THE WIN-WIN-WIN SCENAIRO

Based on the data and facts discussed in the previous sections, SWOT analysis is processed and illustrated in tables 3 and 4. The analysis shows the vital complications of the hydropolitical game in the Blue Nile. While there are several strengths in the basin, there exist severe weaknesses related to the hydrological, social and economic aspects of the three co-basin countries. In addition, there is a wide gap between the potential opportunities and serious threats of constructing a hydropower project on the Blue Nile as the GERD.

In such sort of SWOT matrices, very wise steps, following scientific paths, should be taken to manage the planning and implementation strategies of the project. As shown in figure 5, these strategies should invest the strengths to maximize opportunities and diminish threats. Otherwise, unsuccessful management would leave the weaknesses to diminish opportunities and maximize threats leading at the end to regional conflict.

While the urgent need of Ethiopia to conduct development plans is understandable, the GERD was not managed in a cooperative perspective providing enough time for feasibility studies and preparing well studied construction documents and operation plans, as stated by the IPoE's final report and other studies. The project is managed in a pure political point of view, where Ethiopia considers it a counter-hegemony movement against Egypt's situations along the history, as named by Ibrahim, 2010. This is obvious in the announcement of the GERD project in April 2011 in a totally different design rather than that one assessed in the pre-feasibility studies.

Table 3. Strengths and weaknesses in the Blue Nile Basin, processed after (NBI, 2012).

ET	SU	EG	**Strengths**
✓	✓	✓	Aquatic and terrestrial resources of the basin
✓	✓	✓	Human resources residing around the river
✓	✓	✓	Special related-culture and traditions of the basin's populations
✓	✓		Rainfall precipitation
	✓	✓	River water flow irrigating arable lands in arid climate
ET	**SU**	**EG**	**Weaknesses**
✓	✓	✓	Substantial stresses of growing populations' demands in water, energy and food
✓	✓	✓	Low quality of infrastructural services
✓	✓		Low spatial coverage of infrastructural services
✓	✓		Uneven seasonally fluctuating water flows of the rainfalls and river's runoffs
	✓	✓	Low runoff coefficient of the river
	✓	✓	Aridity of climate
		✓	Lack of water resources
		✓	High dependency factor of water resources (originating outside state's borders)

Table 4. Opportunities and threats of establishing hydrological projects on the Blue Nile

ET	SU	EG	Opportunities
✓	✓	✓	[a]Cooperation of co-basin countries to share benefits of the river
✓	✓	✓	[a]Contributions to holistic developments of the riparian states
✓	✓	✓	[a]Collective transboundary governance of the basin
✓	✓		[a,b]Exploiting hydropower potentials to fulfill development plans
✓	✓	✓	[a]Encouraging power trade and energy mix plans between states
✓	✓		[a]Regulating flows and saving losses
	✓		[a]Developing navigational uses of the river
	✓		[a]Floods protection
	✓		[a]Irrigation expansion to be year-round instead of being seasonal
	✓	✓	[a]Reducing siltation of downstream dams' reservoirs and its costs
	✓		[a]Increasing electricity generation capacity of downstream dams
✓			[b]Creating employment opportunities and business investments
✓			[b]Fishery development
✓			[b]Aquatic and terrestrial fauna resources
✓			[b]Improving infrastructural services for resettled people
ET	**SU**	**EG**	**Threats**
✓	✓	✓	[c]Triggering landslides or earthquakes due to construction works or reservoir loads
	✓	✓	[C,d]Destructive floods in case of project's structural failure
	✓	✓	[d]Deterioration of water quality due to overuse of fertilizers for irrigation expansion
	✓	✓	[d,e,f]Reducing water flows in dry years during filling reservoir and operation phases
✓	✓	✓	[f,g]Conflict between EG+SU and ET over reservoirs' filling policy in dry years, whether to reduce electricity generated or reduce water flow
	✓	✓	[f,g]Conflict between EG and SU over distributing the water flow reductions in dry years
		✓	[d]Loss of arable lands and electricity generation capacity in case of reduction in water flows
		✓	[d]Salination of the Delta's lands and ground water in case of water reduction
✓			[h]Spreading malaria infections after resettlement of indigenous people
✓	✓		[h]Interrupting cultural and traditional livelihoods of local communities
✓			[i]Economic inefficiency due to low plant load factor

Meta Data:

a: (FDRE-MoWR, 2013)
b: (EEPCo, 2013)
c: (Batisha, 2013)
d: (Kantoush, 2013)
e: (Jeuland & Whittington, 2013)
f: (King, 2013)
g: (Hammond, 2013)
h: (Veilleux, 2013)
i: (Beyene, 2011)

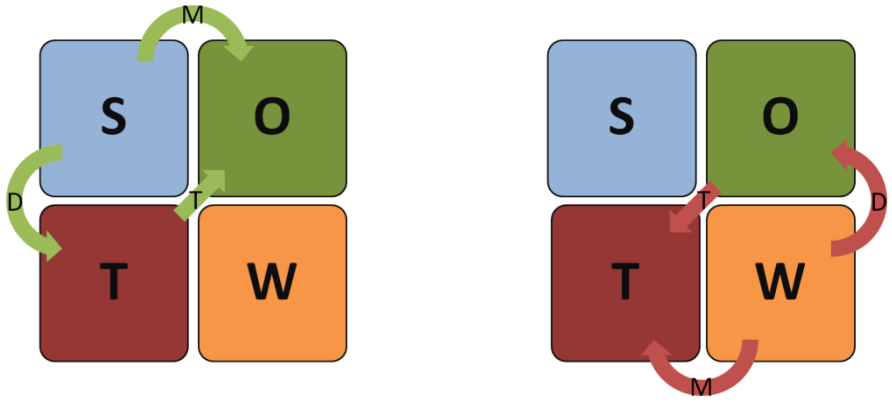
Table 5 illustrates the six probable scenarios of the win or lose status of each country in the hydropolitical game in the Blue Nile for the GERD project. Five scenarios are conflictive if there would be one, two or even the three countries in 'lose' status. While, the only cooperative win-win-win scenario cannot be achieved without implementing transparent and collective strategies of good transboundary water governance, not unilateral decision-making process. This is challenged by the facts of wide shortages of energy and food in Ethiopia, having no other source of water in Egypt and therefore being its lifeline, the changing international relationships and coalitions of both countries, the problems facing Sudan after separation of South Sudan, in addition to the weak water international law and institutions.

Table 5. Scanning expected scenarios in the Eastern Nile hydropolitical game.

Scenario	National Status			Regional Status	Description
	ET	SU	EG		
S1	W	W	W	Cooperation	The three states come together to agree on a clear strategy and solid mechanisms in order to construct multi-purpose projects on the Nile in a way that all of them fulfill their development plans, share benefits, don't harm others and ensure water security (both in quantity and quality).
S2	W	W	L	Conflict	Ethiopia takes its unilateral decision to construct the dams, sharing benefits with Sudan, but ignoring the right of Egypt to participate in the decision-making process and ensure its water security during the phases of filling reservoirs, operation and management in drought seasons.
S3	W	L	L	Conflict	Ethiopia takes its unilateral decision to construct the dams, ignoring the rights of both Sudan and Egypt to assess the proposed project's design and approve it ensuring their safety (in case of structure failure) and water security.
S4	L	L	L	Conflict	Ethiopia takes its unilateral decision to construct the dams with demographical, structural, environmental and economic shortages and defects in design, resulting in risk probabilities of occurring dam failure, deconstructive floods, earthquakes, displacing indigenous people, threatening water and energy security of downstream countries, overusing fertilizers after reducing sediments transport, etc.
S5	L	L	W	Conflict	Egypt objects the construction of any hydrological projects in Sudan and Ethiopia, even in case of preparing full feasibility studies and safe environmental impact assessments.
S6	L	W	W	Conflict	Egypt and Sudan objects the construction of any hydrological projects in Ethiopia, even in case of preparing all required studies ensuring the rights of all countries.

Note: Being a midstream country, it is assumed that Sudan is always merged in "win" or "lose" status with the upstream or downstream country. Accordingly, theoretical scenarios of "W-L-W" and "L-W-L" are excluded.

Table 6. Scenarios of managing the SWOT analysis



8. CONCLUSION

The Nile Basin has been considered a hotspot by previous studies varying in the tendency level of its path, whether cooperative or conflictive. The long history of mistrust between upstream and downstream countries is obvious while tracking the consequent agreements and negotiations that were not able to bring all the riparian states into one basin-wide treaty and powerful legal institution.

The Grand Ethiopian Renaissance Dam (GERD) represents one scene of the long deeply stemmed story in the history. 86% of the Nile's annual average water flow originates in Ethiopia, of which 59% is provided by the Blue Nile. The three countries, sharing the river, substantially rely on utilizing the basin's resources to fulfill their urgent development plans. All of them are facing, in different perspectives, severe challenges to meet the rapidly growing demands of their populations.

The Main Nile represents 96% of Egypt's total annual water resources, where most of Egyptians have been settling around its Valley and Delta for more than 7,000 years. Most of arable lands in Egypt are irrigated by the Main Nile's water. The High Aswan Dam (HAD), generating hydropower, contributes to the Egyptian public grid of electricity. On the other hand, Ethiopia puts very ambitious plans to effectively-fight poverty. These plans require constructing hydrological projects on the Blue Nile to cover wide shortages of energy and food production. These proposed projects might have negative impacts on downstream communities and cause conflict between countries, if they are not trilaterally designed, implemented and managed.

Each country would keep maintaining its right to ensure its national and water security and protect its interests. Sudan, for instance, appeared to change its historical unified situation with Egypt assessing the downstream benefits and risks of the GERD. This could be understandable for the great need of Sudan to the generated electricity from the Ethiopian dam, specially after the separation of South Sudan where most of oil resources exist, beside expanding its irrigated agriculture due to the dam's regulation of river flows.

In the absence of a basin-wide treaty and solid mechanisms of mandatory international law, there is no clear collective process of transboundary water governance. The very sensitive balance of expected benefits and risks on all riparian states is left to the national perspective of each country. Consequently, a very logic result would be mainstreaming the political power degree of each state in controlling the hydropolitical game in the basin.

Even though, following the official statements of the three countries reflects some positive points. Egypt clarified its clear understanding for the right of Ethiopia to utilize the Blue Nile planning for development and fighting poverty, but this should be in a cooperative process not unilateral decision-making in order not to cause any harms to downstream countries and to secure their water rights. On the other hand, Ethiopia announced several times that the Renaissance Dam would not reduce Egypt's watercourse or negatively affect its water security, but also this should be proved in well-prepared feasibility studies. Accordingly, all countries agreed on the principles of 'harms prevention' and 'respect of water security', but still need massive efforts to interpret those concepts in a concrete methodology.

The SWOT analysis, processed by the study, showed the strengths and weaknesses of the Blue Nile Basin that could maximize or diminish the opportunities and threats of the proposed hydrological projects to be constructed on the river. The method, of which these strengths, weaknesses, opportunities and threats are governed, would define the consequences of this hydropolitical game, whether one or two countries would lose, the three lose, or all of them win.

The win-win-win scenario, which is the most difficult but most profitable, could not be achieved in unilateral perspectives but cooperative framework of collective good transboundary water governance. This is challenged with the national perspectives of the three countries, their international relationships and coalitions, and the weak international law.

Table A.1. Treaties, agreements and main events occurred in the Nile Basin.

Year	Treaty/Agreement
1891[a]	Understanding the significant influence of the Ethiopian Highlands on the Nile River, Britain concluded a treaty with Italians colonists to get the right of precluding the construction of any dams in the Atbara River.
1898[a]	The British and Egyptians seized control on Sudan and consequently the Nile waters there.
1902[a,b,c]	Ethiopia was prevented from developing any construction that would alter the flow of the Nile through article III in the 1902 Exchange of Notes with Britain (on behalf of Sudan), while it received the recognition of its independence. Article III made it obligatory for Ethiopia to take the permission of the Egyptian government in prior to the construction of any hydrological projects on the Nile. The treaty was written in English and Amharian languages, where both are official. Unlike the English copy, Ethiopian officials insisted over times that article III in the Amharian copy is not written in mandatory language and consequently argued the validation of its obligations.
1906[a]	Britain concluded an agreement with Belgium to assure water flow from Congo to the Nile River, and did the same with France and Italy regarding the colonies under their control.
1929 [a,b]	The 1929 Exchange on Notes between the UK (representing Sudan) and Egypt regulated the use of irrigation water in the Nile. Egypt got the right of obligatory prior approval upon any hydroelectric projects along the Nile in British colonies, including Kenya, Sudan, Tanganyika and Uganda.
1949 - 1953[a,d]	Egyptian and Ugandan governments, under British patronage, concluded several agreements to construct hydrological projects damming the Lake Vitoria to regulate its water flow around the year and raise its rates, which buttressed hydroelectric needs of Egypt. The agreements were based on 1929 exchange of notes and then were affirmed in another agreement between the two countries in 1991.
1957[a]	Ethiopia repudiated its treaty with Britain in 1902 and asserted that it "has the right and obligation to exploit its water resources for the benefit of present and future generations of its citizens".
1959 [a,b]	The 1959 agreement between Sudan and Egypt, regarding the full utilization of the Nile waters, defined the water allocation between both countries to be 18.5 and 55.5 BCM respectively.
1959[e]	The Ethiopia Emperor Haile Selassie negotiated the divorce of the Ethiopian Orthodox Church from the Orthodox Church in Alexandria (after 16 centuries of institutional marriage), because of the exclusion of Ethiopia in the 1959 treaty between Egypt and Sudan.
1978[a,f]	The Egyptian President Anwar Sadat and Ethiopian Prime Minister Mengistu Haile Miriam exchanged threats over the apportionment of the Nile waters. Sadat said, “Any action that would endanger the waters of the Blue Nile will be faced with a firm reaction on the part of Egypt, even if that action should lead to war. As the Nile waters issue is one of life and death for my people”.
1978 - 1984[a]	The Jonglei channel project was launched in 1978, but then stopped after 6 years. The project aimed to connect the water lost in South Sudan's swamps to the White Nile. The project was stopped not only for the concerns regarding negative environmental impacts, but due to the rejection of Southern Sudanese to bear the cost of benefiting North Sudan and Egypt. Hopes to accomplish this project are being diminished due to the continuous political instabilities and civil wars in South Sudan since 1980 till now.
1980[b]	UNDP supported a series of hydrometeorological studies.
1983 [b]	UNDUGU was formed at Egypt’s behest to foster economic, social, cultural and technical ties.

Year	Treaty/Agreement
1992 [b]	The Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin "TECCONILE" was established. Ethiopia and Kenya refused to participate as full-members but observers. They explained that the framework did not illustrate clearly 'equitable' mechanisms of sharing waters. In addition, they believed that Egypt practiced 'domination' on the action.
1993[c]	Egypt and Ethiopia signed an agreement for the sustainable full-utilization of Nile waters. The agreement used general terms of 'equitable' and 'fair' sharing of resources and the commitment of not causing 'appreciable' harms to downstream countries. However, it did not state clearly solid mechanisms of implementing these principles.
1995 [b]	The Nile River Basin Action Plan was created as part of the meetings of TECCONILE.
1993-2002 [b]	Series of informal meetings were held in form of sessions and open discussions (known as 2002 Nile Conferences), supported by CIDA, UNDP and the World Meteorological Organization.
1999 [b]	The Nile Basin Initiative (NBI) was launched led by the World Bank, CIDA and UNDP stating the Strategic Action Plan (SAP). All riparian states were involved as full-members with Eritrea participated as an observer. The World Bank's Senior Water Advisor for the Africa Region introduced the concept of 'sharing baskets of benefits' rather than 'allocating water rights'. Ethiopia hardly accepted the principle of 'prior notification' of Nile water uses that may affect other riparian states. Shared Vision Program (SVP) was defined to conduct a series of applied projects funded by riparian states, World Bank, CIDA and UNDP. The Nile-COM is the highest decision-making body of the NBI. Most of the SVP and sub-regional projects were accomplished by 2012.
2010[d,g,h]	After ten years of fruitless negotiations, the draft of the Cooperative Nile Basin Framework Agreement (CFA) was signed in Entebbe by five of upstream countries leaded by Ethiopia. Burundi followed the signatories in 2011. Egypt and Sudan rejected this draft due to the principles of 'prior notification' and recognition of previous treaties, in addition to unclear definition of 'water security'.

Meta Data:

a: (Brunnee & Toope, 2002, pp. 106, 122 - 126)
b: (Paisley & Henshaw, 2013, pp. 63-67)
c: (Degefu, 2003, pp. 93-140)
d: (EMFA, 2010)
e: (Carlson, 2013)
f: (Kendie, 1999, p. 157)
g: (Ibrahim, 2011)
h: (BBC, 2013)

REFERENCES

Al-Haj, A.-M. (2013, December 5). *Al-Bashir: We Support the Construction of the Renaissance Dam*. Retrieved March 19, 2014, from Al-Intibaha News: http://alintibaha.net/portal/home1/%D8%A2%D8%AE%D8%B1-%D8%A7%D9%84%D8%A7%D8%AE%D8%A8%D8%A7%D8%B1-1/42871-%D8%A7%D9%84%D8%A8%D8%B4%D9%80%D9%8A%D9%80%D8%B1-%D9%86%D9%80%D8%A4%D9%8A%D9%80%D8%AF-%D9%82%D9%80%D9%8A%D9%80%D8%A7%D9%85-%D8%B3%D9%80%D9%80%D9%80%D8

Aljazeera. (2014, March 6). *Ethiopian Water Minister: The Renaissance Dam Would not Affect the Watercources of Egypt and Sudan*. Retrieved March 31, 2014, from Aljazeera Channel Mubasher-Misr: http://mubasher-misr.aljazeera.net/news/201436173839582707.htm

Batisha, A. F. (2013). Sustainability Assessment of Grand Renaissance Dam: Regarding Landslides in Ethiopia. (http://www.humanpub.org/ijs/ppl/ijs11ppl.pdf, Ed.) *International Journal of Sustainability , Volume 2* (Issue 1.3), 25-38.

BBC. (2013, June 16). *BBC News*. Retrieved March 31, 2014, from Ethiopia Ratifies River Nile treaty Amid Egypt Tension: http://www.bbc.com/news/world-africa-22894294

Beyene, M. (2011). *How Efficient is the Grand Ethiopian Renaissance Dam?, International Rivers*. Retrieved March 1, 2014, from http://www.internationalrivers.org/files/attached-files/ethiopiadamefficiency.pdf

Brunnee, J., & Toope, S. J. (2002). The Changing Nile Basin Regime: Does Law Matter? (http://www.unwatercoursesconvention.org/images/2012/10/Nile-Basin-Regime-Does-Law-Matter.pdf, Ed.) *Harvard International Law Jounral , 43* (1), 105 - 159.

Carlson, A. (2013, March). *Who Owns the Nile? Egypt, Sudan, and Ethiopia's History-Changing Dam*. Retrieved March 27, 2014, from Origins: Current Ecents in Histrocial Perspective, Volume 6, Issue 6, Ohio State University, College of Arts and Sciences: http://origins.osu.edu/article/who-owns-nile-egypt-sudan-and-ethiopia-s-history-changing-dam

Davison, W. (2013, October 3). *Ethiopian Hydropower Dam Assessment Warns of Structural Weakness*. Retrieved March 12, 2014, from Bloomberg News: http://www.bloomberg.com/news/2013-10-03/ethiopian-hydropower-dam-assessment-warns-of-structural-weakness.html

Degefu, G. T. (2003). *The Nile: Historical, Legal and Developmental Perspectives – A Warning for the 21st Century.* Bloomington: Trafford.

Dinar, A., & Nigatu, G. S. (2013). Distributional Considerations of International Water Resources under Externality: The Case of Ethiopia, Sudan and Egypt on the Blue Nile. *Water Resources and Economics, Elsevier B.V. , Volumes 2-3*, 1-16.

EAPP & EAC. (2011). Final Master Plan Report: Regional Power System Master Plan and Grid Code Study. (http://www.eappool.org/eng/pub/masterplan/Final%20Master%20Plan%20Report%20Vol%20I.pdf, Ed.) *Eastern Africa Power Pool (EAPP) and Eastern African Community (EAC)* .

EEPCo. (2013). *About the Grand Ethiopian Renaissance Dam, Ethiopian Energy Production Co. (EEPCo)*. Retrieved March 2, 2014, from http://www.eepco.gov.et/abouttheproject.php?pid=1&pcatid=2

EMFA. (2010, April 21). *The Outcomes of the Extraordinary Meeting of the Ministers of Water of the Nile Basin Countries Sharm El Sheikh*. Retrieved March 31, 2014, from The Egyptian Ministry of Foreign Affairs: http://www.mfa.gov.eg/ENGLISH/MEDIACENTER/STATMENTS/Pages/StatementDetails.aspx?Source=6781921f-3993-444a-859e-ee26ce851de8&newsID=b750e94c-aa0f-4efd-9998-46d07fa0b515

ESIS. (2013, November 20). *Ethiopia Dam Crisis Can Be Solved*. Retrieved March 22, 2014, from The Egyptian State Information Service: http://www.sis.gov.eg/En/Templates/Articles/tmpArticleNews.aspx?ArtID=71263#.UyvyU4U31OM

ESIS. (2014, February 20). *Foreign Minister's Tanzania & Congo Visits*. Retrieved March 22, 2014, from The Egyptian State Information Service: http://www.sis.gov.eg/En/Templates/Articles/tmpArticles.aspx?CatID=2780#.Uy1KaYU31OM

ESIS. (2014, March 2). *Irrigation Minister: Steps to Be Taken to Solve Renaissance Dam Crisis*. Retrieved March 22, 2014, from The Egyptian State Information Service: http://www.sis.gov.eg/En/Templates/Articles/tmpArticleNews.aspx?ArtID=76391#.Uyydx4U31OM

ESIS. (2013, June 4). *Report Summary of the Tripartite International Panel of Experts Studying the Ethiopian Renaissance Dam: The Submitted Studies have Enormous Shortages*. Retrieved March 12, 2014, from The Egyptian State Information Service: http://www.sis.gov.eg/Ar/Templates/Articles/tmpArticles.aspx?ArtID=70137#.UyCnqoU31ON

FAO. (2013). *AQUASTAT Database, Food and Agriculture Organization of the United Nations (FAO)*. Retrieved February 19, 2014, from http://www.fao.org/nr/water/aquastat/main/index.stm

FDRE-MFA. (2014, February 11). *Prime Minister Hailemariam on the Grand Ethiopian Renaissance Dam Project*. Retrieved March 17, 2014, from The Ministry of Foreign Affairs of the Federal Democratic Republic of Ethiopia: http://www.mfa.gov.et/news/more.php?newsid=3009

FDRE-MFA. (2013, June 14). *The International Panel of Experts' Report on the Grand Ethiopian Renaissance Dam*. Retrieved March 12, 2014, from The Ministry of Foreign Affairs of the Federal Democratic Republic of Ethiopia: http://www.mfa.gov.et/weekHornAfrica/morewha.php?wi=1024

FDRE-MoWR. (2007b, September 20). *Baro and Karadobi Projects, Federal Democratic Republic of Ethiopia, Ministry of Water and Energy*. Retrieved March 15, 2014, from http://www.mowr.gov.et/index.php?pagenum=4.3&pagehgt=1000px&ContentID=52

FDRE-MoWR. (2007a). *Border and Mendaya Projects, Federal Democtratic Republic of Ethiopia, Ministry of Water and Energy*. Retrieved March 2, 2014, from http://www.mowr.gov.et/index.php?pagenum=4.3&pagehgt=1000px&ContentID=55

FDRE-MoWR. (2013, June 27). *Ethiopian National Panel of Experts: Unwaranted Anxiety*. Retrieved March 23, 2014, from The Ministry of Water and Energy of the Federal Democratic Republic of Ethiopia: http://www.mowr.gov.et/index.php?pagenum=0.1&ContentID=88

GCAO. (2012, February 27). *The Speech Made by MP Meles Zenawi*. Retrieved March 19, 2014, from Ethiopian Government Communication Affairs Office: www.gcao.gov.et/index.php?option=com_content&view=article&id=85%3Athe-speech-made-by-mp-meles-zenawi-of-ethiopia-at-the-official-commencement-of-the-millennium-dam-project&catid=70%3Athe-grand-ethiopian-renaissance-dam&Itemid=164&lang=en&limitstart=1

Gleik, P. H. (2000). *The World's Water 2000-2001: The Biennial Report On Freshwater Resources.* Washington, D.C.: Island Press.

HAILU, A. (2014, January 17 and 20). *GERD No Financial, Technical Constraints, and Tripartite Discussion Terminated Owing to Egyptian Proposal against Ethiopia's Interest: Official*. Retrieved March 21, 2014, from Ethiopian Herald, Ethiopian Press Agency: http://www.ethpress.gov.et/herald/index.php/herald/editorial/5659-gerd-no-financial-technical-constraints and http://www.ethpress.gov.et/herald/index.php/herald/news/5628-tripartite-discussion-terminated-owing-to-egyptian-proposal-against-ethiopia-s-inter

Hammond, M. (2013). The Grand Ethiopian Renaissance Dam and the Blue Nile: Implications for Transboundary Water Governance. (http://www.globalwaterforum.org/wp-content/uploads/2013/02/The-Grand-Ethiopian-Renaissance-Dam-and-the-Blue-Nile-Implications-for-transboundary-water-governance-GWF-1307.pdf, Ed.) *University of Exeter , Discussion Paper no. 1307*.

Hassan, A., & Kantoush, S. A. (2013, September 8-13). Application of the Swat Model in the Eastern Nile Basin under Different Scenarios. (http://www.iahr2013.org/download/130903%20Congress%20Handbook.pdf, Ed.) *35th IAHR World Congress* .

Hassan, T. M., Attia, F. A., & El-Attfy, H. A. (2004). *Groundwater Potentiality Map of the Nile Basin Countries: A Step towards Integrated Water Management.* Cairo: Egyptian Ministry of Water and Irrigation.

Ibrahim, A. M. (2011). The Nile Basin Cooperative Framework Agreement: The Beginning of the End of Egyptian Hydro-Political Hegemony. *MO. ENVTL. L. & POL'Y REV., Vol. 18, No. 2* , 282-313.

ISU. (2006). *SWOT Analysis Resource Page*. Retrieved February 28, 2014, from Idaho State University: http://www.isu.edu/acadaff/swot/

Jeuland, M., & Whittington, D. (2013, March). Water Resources Planning under Climate Change: A "Real Options" Application to Investment Planning in the Blue Nile. (http://www.efdinitiative.org/sites/default/files/publications/efd-dp-13-05.pdf, Ed.) *Environment for Development (EfD), Discussion Papers Series* .

Kantoush, S. A. (2013, November 6-7). The Downstream Impacts of Ethiopia's Cascade Dams in the Upper Blue Nile on Egypt. (w.-c. C. Programme-4_11.pdf, Ed.) *Sustainable Building International Conference 2013* .

Kendie, D. (1999). Egypt and the Hydropolitics of the Blue Nile River. (http://muse.jhu.edu/journals/northeast_african_studies/v006/6.1kendie.pdf, Ed.) *Northeast African Studies , 6* (1-2), 141-160.

King, A. M. (2013). *An Assessment of Reservoir Filling Policies under a Changing Climate for Ethiopia's Grand Renaissance Dam.* (http://idea.library.drexel.edu/bitstream/1860/4267/1/King_AndrewMS.pdf, Ed.) Drexel: Drexel University.

Lele, U., Klousia-Marquis, M., & Goswami, S. (2013). Good Governance for Food, Water and Energy Security. *Aquatic Procedia, Elsevier B.V. , Volume 1*, 44-63.

Malone, B. (2011, April 18). *Ethiopia Keeping Egypt in Dark on Nile Dam*. Retrieved March 19, 2014, from Thomson Reuters: http://www.reuters.com/article/2011/04/18/us-ethiopia-nile-idUSTRE73H59220110418

NBI. (2012). *State of the River Nile Basin Report.* The Nile Basin Initiative, Nile-SEC, ENSAP and NELSAP.

NBI-ENTRO. (2007). Strategic Environmental and Social Assessment, M5 and M6, Pre-Feasibility Studies and Regional Investment Program. *Eastern Nile Power Trade Porgram Study, Eastern Nile Technical Regional Office, Nile Basin Initiative* .

NCCPPC-GERD. (2013). *International Panel of Experts on GERD Releases its Report*. Retrieved March 12, 2014, from The Office of National Council for the Coordination of Public Participation on the Construction of the Grand Renaissance Dam: http://www.hidasse.gov.et/web/guest/home/-/asset_publisher/7OTn/content/international-panel-of-experts-on-gerd-releases-its-report

Negash, F. (2012). Managing water for Inclusive and Sustainable Growth in Ethiopia: Key Challenges and Priorities. (http://erd-report.eu/erd/report_2011/documents/dev-11-001-11researchpapers_negash.pdf, Ed.) *European Report on Development* .

Paisley, R. K., & Henshaw, T. W. (2013). Transboundary Governance of the Nile River Basin: Past, Present and Future. *Journal of Environmental Development, Elsevier B.V. , Volume 7*, 59-71.

Schmeier, S. (2010). *Governing International Watercourses: Perspectives from Different Disciplines, A Comprehensive Literature Review.* Berlin: Hertie School of Governance.

Shetewy, M. A.-A. (2013). Legal Commitments regulating the Establishment of Water Projects on International Rivers: Application Study over the Nile Basin. (http://www.sis.gov.eg/newvr/afaken39/6.pdf, Ed.) *African Perspectives, Studies and Articles , Volume II* (Issue 39), 29-35.

Sudan Tribune. (2014, February 19). *Sudan FM Criticises Egypt over Ethiopian Dam Dispute*. Retrieved March 17, 2014, from Sudan Tribune News: http://www.sudantribune.com/spip.php?article50013

Sudan Tribune. (2013, December 5). *Sudan's Support to Ethiopian Dam is Economically Motivated: Bashir*. Retrieved March 19, 2014, from Sudan Tribune News: http://www.sudantribune.com/spip.php?article49070

Swain, A. (1997). Ethiopia, the Sudan, and Egypt: The Nile River Dispute. *Journal of African Studies , 35* (4), 675 - 694.

Taye, S. (2014). *Options of Cooperation Are Still Open*. Retrieved March 17, 2014, from Ethiopian Herald, Ethiopian Press Agency: www.ethpress.gov.et/herald/index.php/herald/editorial/6215-options-of-cooperation-are-still-open

UN. (2014). *Chapter XXVII: Environment, Convention on the Law of the Non-Navigational Uses of International Watercourses, Signature Status, United Nations*. Retrieved February 17, 2014, from https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&lang=en

UNDP. (2011). *Human Development Report 2011: Sustainability and Equity - A Better Future for All.* Human Development Reports (HDR). United Nations Development Program (UNDP).

UNDP. (1994). *Initiatives for Change: Good Governance and Sustainable Human Development, United Nations Development Programme (UNDP)*. Retrieved February 25, 2014, from http://mirror.undp.org/magnet/policy/chapter1.htm

UN-Water. (2008). *Transboundary Waters: Sharing Benefits, Sharing Responsibilities (UN Thematic Paper).* Retrieved February 15, 2014, from United Nations - Water: http://www.unwater.org/downloads/UNW_TRANSBOUNDARY.pdf

Veilleux, J. C. (2013). Human Security Dimensions of Dam Development: The Grand Ethiopian Renaissance Dam. (http://www.transboundarywaters.orst.edu/publications/publications/Veilleux_GLOBAL%20DIALOGUE_V15_GERD.pdf, Ed.) *Global Dialogue - Water: Cooperation or Conflict? , Volume 15, Nummber 2*.

Wolf, A. T. (2007). Shared Waters: Conflict and Cooperation. *The Annual Review of Environmental Resources , ANRV325-EG32-03*, 3.1-3.29.

World Bulletin. (2014, March 13). *Ethiopia Dam to Start Yielding Power by Late 2015* . Retrieved March 17, 2014, from World Bulletin News Desk: http://www.worldbulletin.net/world/130950/ethiopia-dam-to-start-yielding-power-by-late-2015

Wouters, P. (2013). *International Law - Facilitating Transboundary Water Cooperation.* Stockholm: Global Water Partnership Technical Committee (TEC).

WRR. (2013). *Ethiopia's Biggest Dam Oversized, Experts Say, World Rivers Review (WRR), International Rivers*. Retrieved March 1, 2014, from http://www.internationalrivers.org/resources/ethiopia%E2%80%99s-biggest-dam-oversized-experts-say-8082

Yoffe, S., Wolf, A. T., & Giordano, M. (2003). Conflict and Cooperation over International Freshwater Resources: Indicators of Basins At Risk. *Journal of the American Water Resources Association , Paper no. 02036*, 1109-1126.