The evolution of the Nile regulatory regime: a history of cooperation and conflict

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Abstract

The objective of this study is to trace the historical evolution of the present Nile Basin regulatory framework and examine its influence on the current interactions among Nile riparian states. This research adopts a case-study design, with in-depth qualitative analysis of the Nile Basin as an example of the complex transboundary relations over shared waters. It uses an analytical framework derived from the New Institutional Economics (NIE) to analyse the evolution of the institutional framework that has governed the Nile basin and how it affected the annual water share allocated to each riparian country. The study argues that the historical beliefs and social norms of the riparian societies have been among the major factors that influenced the cooperation attempts during the past century and determined their outcomes. Therefore, a prerequisite to develop sustainable cooperation is levelling the playing field by addressing the beliefs and norms that have prevented cooperation while identifying the beliefs that can support cooperation.

Keywords Nile basin · Transboundary water governance · Transboundary water history · New institutional economics · Water cooperation · Water conflict

Introduction

The River Nile is the longest river in the world with a length of about 7000 km and its drainage basin covers a surface area of over 3 million square kilometres (NBI 2012). The Nile Basin (Fig. 1) is approximately one-tenth of the total surface area of the African continent (Shahin 1985). The river course and its tributaries traverse the territories of 11 African countries. These countries are Burundi, Rwanda, Tanzania, Kenya, Uganda, The Democratic Republic of Congo (DCR), Ethiopia, Eritrea, Sudan, South Sudan (since 2011) and Egypt.

Despite the long length of the river and the huge size of its basin, the total flow of the Nile is relatively small. The small size of the total flow is caused by the fact that the areas which contribute significantly to the Nile flow are relatively small and isolated (Sutcliffe

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Fig. 1 Nile river basin map —modified from (IBRD 2014)

and Parks 1999). Only two small regions are the major sources of the Nile: the East African lakes region and the Ethiopian highlands. On the contrary, two-fifths of the basin

area is arid and hyper-arid and contributes little or no runoff to the river (NBI 2012). The amount of runoff that feeds the Nile River constitutes a very small proportion of total rainfall in the basin. Although the total annual rainfall on the basin reaches nearly 1800 billion cubic meters on average, the annual flow of the Nile that reaches Aswan in the south of Egypt is around 84 billion cubic meters. In other words, the annual flow of the Nile that reaches Egypt to be shared with Sudan is less than 5% of the total water that falls as rain on the basin (Johnston 2012; NBI 2014).

The history of the Nile basin and its importance has induced researchers to analyse the basin from various perspectives. These perspectives have included hydrological studies (Shahin 1985; Said 1993; Sutcliffe and Parks 1999), historical studies (Erlach and Gershoni 2000; Collins 2002; Tvedt 2006, 2010), legal studies (Brunner and Toope 2002; Degefu 2003; and Woldetsadik 2013); political economy studies (Allan 1999 and Waterbury 2002), and political studies (Yohannes 2009; Adar and Check 2011; Melesse et al. 2014). Recently, persistent tensions among Nile riparian countries have stimulated researchers to use game theory to analyse the strategic interactions among these countries (Wu 2009; Elimam et al. 2008; Madani et al. 2011). However, neither of these studies have examined the dynamics of the historical evolution of the Nile Basin regulatory framework nor have they examined their impact on the current situation in the Nile Basin. Thus, this study aims to fill this gap by tracing the historical evolution of the present Nile Basin regulatory framework and examine its influence on the current interactions among Nile riparian states.

Analytical framework

This paper adopts an analytical framework derived from the New Institutional Economics (NIE) to analyse the evolution of the regulatory framework that has governed the Nile basin and to investigate how it has affected the annual water share allocated to each riparian country. The adopted NIE framework relies on the institutional analysis of action arena (IAAA) model developed by Elinor Ostrom (1990). The IAAA model is a static model that analyses the regulatory structure of the common pool resource (CPR). Thus, it is used to map the main stages of the evolution of the regulatory regime of the Nile Basin.

The IAAA model has three structural components (Fig. 2). In the first component, the physical environments that act upon the CPR are examined. The conditions of the physical environment that affect the action arena include: the common resource size, the number of appropriators in the resource system, the temporal and spatial variability of the resource

Fig. 2 Analytical framework-institutional analysis of action arena (IAAA) model

units in the resource system, the current state of the common resource, economic conditions of resource units, and the availability of data about the resource system (Ostrom 1990). The second component of the sub-model is the institutional environment of the CPR. This layer includes the status quo of the formal and informal institutions that regulate the common resource system. The third component is the pattern of distribution of CPR benefits among appropriators under the status quo institutional environment. This component has three parameters: the average flow of resource unit to each appropriator, the variability of resource unit flow to each appropriator, and the quality of flow of resources received by each appropriator.

Ostrom has followed the definition of institutions introduced by Douglass North in his institutional environment model. North (1990) defined institutions as constraints that actors develop to reduce their costs of interactions by reducing uncertainty. The institutional environment of a particular society is composed of formal and informal institutions and their enforcement characteristics (North 2008). Formal institutions are the written rules that govern polity and economy. Informal institutions are the unwritten conventions and codes that underlie the behavioural traits (Ménard and Shirley 2008). These informal institutions can be divided into complementary, normative, and cognitive institutions (North 1990). Complementary institutions can be extensions, enhancements, or adjustments of formal institutions (North 1990). Normative institutions involve the social norms and values that constrain the behaviour of individuals. Cognitive institutions are subconsciously accepted standards, beliefs and “frames through which meaning is developed” that internally constrain behaviour (Scott 1995).

An institutional framework acquires stability in a society when its actors internalise its institutions over time. This internalisation process, also called institutionalisation, begins by developing gradually informal institutions as complementary informal institutions to the existing formal institutions (North 1990). Subsequently, actors internalise these informal institutions which then act as the main determinants of their internal process of formation of their perception and become deeply enrooted and persistent to change (North 2008). Over time, actors transmit their informal institutions as normative institutions to their descendants who then perceive them as objective realities. Thus, these informal institutions deepen as they become gradually institutionalised as objective normative realities independent from their origin (Zucker 1991). The deeper the informal institutions are, the more stable and more resistant to change is the institutional framework (Tayia and Madani 2017).

Methodology

This paper provides an in-depth qualitative analysis of the Nile Basin. The efforts to establish the modern legal framework began with the British colonisation of Egypt in 1882. Therefore, the study period starts in 1882 and extends to the 2010, just before Ethiopia unilaterally announced the construction of the Grand Ethiopian Renaissance Dam in 2011. As the construction of this dam and the negotiations over its filling and operation is still ongoing, We have decided to study the period that preceded this unilateral declaration. Our focus is four riparian countries: Egypt, Sudan, Ethiopia and Uganda. These four countries are considered “the quartet of major stakeholders in the Nile Basin” during the study period (Waterbury 2002, p. 5). Owing to practical constraints, the article relies on providing an in-depth quantitative and qualitative analysis, using mainly secondary sources.

Using Ostrom's model to examine the layers of the institutional structure of the Nile Basin, the article begins by analysing the conditions of the physical environment of the Nile Basin, which represents the first layer of this structure, and briefly relates these conditions to the actions of riparian parties during this period. The analysis includes an examination of the regulatory environment of the Nile Basin. The origins of the regulatory environment are rooted in the customary traditions and the culture of the societies that have lived around the Nile for thousands of years. The paper maps these cultural beliefs and customary norms that have regulated the Nile water. These beliefs and norms represent the informal institutions of the regulatory institutional framework of the Nile. The analysis is continued by gradual addition of the different layers of the formal legal agreements that were concluded in our modern times. These agreements represent the formal institutions of our basin-wide institutional framework. Finally, the interactions between the informal and formal institutions that form the meshwork of the Nile regulatory environment are examined.

Conditions of physical environment of the Nile basin

The section uses the first analytical component of IAAA model, i.e. the physical environments that act upon the CPR, to map the physical conditions of the Nile in the beginning of study period. The analysis shows that the physical conditions of the Nile during this period were significant catalysts of the efforts of the riparian countries to regulate the waters of the Nile, both legally and technologically. Almost all major regulatory agreements governing the Nile were achieved in the period that extended from the second half of the nineteenth century to the end of the first half of the twentieth century. This historical period can be divided into two sub-periods according to the annual discharge of the Nile. The first period starts from 1870 and extends to 1898. The second period covers the first half of the twentieth century.

The first sub-period is characterised by high annual discharges of the Nile measured by the Nilometers in Cairo in Egypt. The average annual discharge during this sub-period was 109,775 billion cubic metres (Fig. 3). Moreover, the annual discharges of the Nile were above 100 billion cubic metres in most of this sub-period. The least recorded annual discharge of the Nile during this period was about 80 billion cubic metres, which is very close to the present average annual flow of the Nile at Khartoum.

The second sub-period is characterised by low annual discharges of the Nile with the exception of a few years (Fig. 4). The recorded annual discharges were lower than 100 billion cubic meters most of the time with exception of only 5 years. The average annual discharge during this period was 82.6 billion cubic meters. In 1913, the annual Nile flow had declined to 45.5 billion cubic meters, one of the lowest recorded flows of the Nile in modern history. Egypt was the country that was most affected by the decline in the Nile flow. This decline is the most significant aspect of the physical environment of the Nile Basin during the 1899–1945 sub-period (Fig. 5).

The decline in the annual discharge of the Nile from the beginning of the twentieth century was among the factors that have induced Egypt, as the then primary water consumer of Nile waters, to concentrate its efforts to guarantee, and if possible, increase its annual supply of water. These efforts took two forms: technical and diplomatic. The technical efforts aimed at establishing reservoirs and dams in Egypt and in other Nile riparian countries to mitigate the negative impacts of flood and drought periods on the Egyptian population in general and on the Egyptian agricultural sector in particular. Since these technical efforts

Fig. 3 Annual flow of the Nile at Aswan during the 1871–1898 period (Hurst et al. 1946)

Fig. 4 Annual flow of the Nile at Aswan during the 1899–1945 period (Hurst et al. 1946)

were regarded as insufficient to achieve the objectives, Egypt also had to intensify its diplomatic efforts. Egypt worked together with the United Kingdom, its colonising power until 1954, to establish a legal framework that guaranteed the annual water requirements of Egypt. These legal frameworks took the form of binding bilateral agreements with other riparian countries.

Fig. 5 Institutional structure of the Nile basin-physical environment

Institutional environment of the Nile basin

This section uses the second analytical component of IAAA model, i.e. the institutional environment of the CPR, to analyse the physical conditions of the Nile in the beginning of the study period. To understand the institutional environment of the Nile Basin at the beginning of the modern period, it analyses the historical relations between Egypt and the other riparian countries. This analysis helps identify the main informal institutions that limited and shaped these relations concerning the Nile. The study then identifies the main formal institutions developed during the modern period and finally evaluates their impact on the relations between the riparian states.

Informal institutions

A full analysis of the informal institutions of the Egyptian nation and those of the other three riparian countries is beyond the scope of this study. However, the main informal institutions that have influenced relations between Egypt and Sudan, Ethiopia, and Uganda over the Nile can be briefly explored. First, the Nile-related informal institutions in Egypt are examined. This is followed by the analysis of the informal institutions that have characterised the relations between Egypt and the other three riparians: Ethiopia, Sudan and Uganda. Since the relations between Egypt and Ethiopia are the most complicated among the riparian countries, a more detailed analysis is devoted to these two riparians.

Nile-related informal institutions in Egypt

Identifying the Nile-related informal institutions of Egypt requires considering Egypt in its African context. The environmental and geographical reality of Egypt in Africa played an important role in shaping the history and the culture of Egypt, especially its relation to the Nile (Karenga 2003). Egypt has been the part of Africa that receives its source of life, i.e. the Nile water, from its mother continent while providing a bridge to Asia (Connah 2015). Relying on the Nile, Egypt developed a flourishing ancient African civilization that provided the earliest example of social complexity in Africa and the world (Obenga 2004). This Egyptian civilization of the Pharaonic period was intrinsically an African civilization, on account of its spiritual religion, character, culture, and achievement (Obenga 2004). It

was not until the end of the Egyptian Pharaonic period that this Afro–Asian bridge became culturally influential on Egypt with the advance of two Abrahamic religions, Christianity and Islam (Diop 1989). Thus, while the role of the Nile in shaping Egypt's culture has been consistent, religion's role has varied over the different phases of the Egyptian history.

The Nile and religion have played major inter-related roles in the evolution of Egyptian society. Egyptians have recognised from their early history that they owe their civilization to the River Nile. The Nile has played an important role not only in the development of the Egyptian state, but also in the evolution of Egyptians' religious beliefs. Religion has been a major determinant of Egypt's culture and identity as well as in the way they perceive the other nations that share Nile waters.

The centrality of the role of the Nile to Egypt has been one of the most distinctive characteristics of Egyptian history and culture. The evolution of the sophisticated ancient Egyptian civilization with its unique dependence on that river coming from an unknown source led Greek philosophers to believe that its floods had been released by the winds that created the world (Evans 1994). Around 10,000 years ago, the Nile started to transfer silts from its sources in the Ethiopian highlands and equatorial lakes to form the flood plains and delta that could support agriculture in Egypt (Said 1994). Egyptians started their first agricultural production in about 5200 BC by sowing seeds and leaving the task of watering and land fertilisation to the natural floods (Chesworth 1994). Therefore, Egyptian society was characterised from the beginning by the dependency of Egyptians on river water instead of rainfall (Hamdan 1967). The Nile with its fluctuating behaviour forced the Egyptians to invent certain agricultural technologies (Moret 1927). Artificial-irrigation-based agriculture, including organised flooding and draining by sluice gates and water dikes, was established by the first Pharaonic Dynasty around 3100 BC (Chesworth 1994). This pattern of agricultural activity induced the establishment of the oldest bureaucratic government and the oldest territorial state in the history of humanity (Assmann 2002). This government played the role of mediator between the people and the environment within a defined, bounded territory (Hamdan 1967).

The heavy dependence of the ancient Egyptian civilization on the Nile floods is reflected in the correlation that has been revealed by modern research between sequences of high and low floods of the Nile and the rises and falls of Egyptian dynasties (Evans 1994). This close link between the state of the Nile and that of their civilization is deeply established in Egyptian minds. Egyptians have believed that the Nile is the basis of their lives and security. Such dependence was noted by the Greek historian Herodotus in the fifth century BC when he claimed that Egypt is the "land acquired by the Egyptians and a gift of the river" (Griffiths 1966). Since no other riparian nation has relied on the Nile as much as Egypt, Egyptians never confronted significant competition from other riparian countries throughout its history. Thus, *Egypt's historic rights to the Nile water* was gradually institutionalised as one of the main Nile-related informal institutions of the Egyptian society. This concept of historic rights is "a concept as ancient as Egypt itself" (Erlikh 2002).

Religion has also been one of its main building blocks of the ancient Egyptian society. In ancient Egypt, the monarchical exercise of power was interpreted as a form of divine rule by proxy (Assmann 2002). Since Dynastic Egypt was a territorial state isolated from neighbouring empires for the most of its ancient history, religion did not define Egyptians' identity in relation to other nations. In other words, religion was established only a formal institution of faith.

After the fall of Dynastic Egypt, however, the spread of Christianity gradually deepened and changed the role of religion in the Egyptian society (Assmann 2002). Under the Roman Empire, Christian Egyptians suffered from increasing oppression after the third

Century AD (Henderson 2005). Thus, they gradually developed a complementary informal institution of religion as determinant of identity, in addition to the formal institution of religion as faith. Subsequently, with the arrival of Islam to Egypt, religion attained a much more comprehensive role. In particular, when Egypt assumed a special significance for the Islamic empire during the Middle Ages, it became the center of the empire. For more than 400 years, from the twelfth to the beginning of the eighteenth centuries, Egypt played a very strong and influential role in defending the Islamic Empire (Winter 2008). This growing role of Egypt deepened the institutionalisation of religion, leading to the establishment of religion as a normative informal institution of identity that influenced the way Egyptians identified themselves in relation to other nations. During this period, the two Egyptian informal institutions of religion as determinant of identity and the Egyptian historic rights to the Nile water became increasingly linked in Egypt.

Interdependence between informal institutions in Egypt and Ethiopia: religion and the Nile

Contacts between Egypt and Ethiopia have existed since the ancient times. Some anthropologists have argued that there was some Ethiopian influence on the Pharaonic civilization. It has also been argued that some of the Ethiopian symbols and ceremonies have Egyptian origins. While this evidence has led some to claim that the Ancient Egyptians were of Ethiopian origin, others have claimed that the Ethiopian culture has been influenced by successive Egyptian migrations (Firmin 2004). There are various historical references to contacts between the ancient Egyptian and Ethiopian kingdoms. However, the Ethiopian–Egyptian relations did not intensify until the early medieval centuries. Since then the two countries have become mutually interdependent (Pankhurst 2000). These relations have been influenced by religion and the variations in the flows of the Nile and its tributaries.

Though we have just discussed religious identity as an informal determinant, religions are also institutions, and so religion was also an institutional determinant of Ethiopian–Egyptian relations. The Ethiopian kingdom was the third political entity to adopt Christianity, in the fourth century, after Armenia and the Roman Empire (Erlikh 2002). Since its introduction in Ethiopia, Christianity has been not only the major religion of Ethiopians, but also the major determinant of Ethiopian identity. Ethiopian Christianity has played two main historical roles. First, it absorbed the local traditions and merged popular beliefs to establish a “common reservoir” for Ethiopian culture (Erlikh 2002). The Christian religion and church became the main source of legitimacy for the successive Ethiopian regimes. Second, Christianity has become a major link of Ethiopia with the outside world, and in particular with Egypt. The Ethiopian Church attached itself almost from its establishment to the Christian Coptic Church of Alexandria as a bishopric of the Egyptian Church (Erlikh 2002).

This vital link between the Egyptian and the Ethiopian Church resulted from the historical evolution of Christianity in Ethiopia. Christianity was established in Ethiopia by two Syrian brothers who were rescued from a shipwreck on the Ethiopian coast. Later, one of them went back to Syria but the other went to Egypt where he was consecrated by the Patriarch of Alexandria as a bishop of the Egyptian Church in Ethiopia. He was given the name “Salama” and the title of Abuna, which means “our father” in Arabic and Geez, or “abun” in Amharic (Meinardus 1970). When he returned to Ethiopia, he was recognised by the royal court as the head of the Ethiopian Church. From then until 1951, the successive

heads of the Ethiopian Church were Egyptian monks appointed by the Egyptian Church to lead the Ethiopian Church, numbering 111 Egyptian Abuna in succession (Erlikh 2002). This led to the establishment of the Ethiopian Church as a daughter or a bishopric of the Patriarchate of Alexandria (Meinardus 1970). This bond remained in place until 1959 when the two Churches agreed to sever it, making the Ethiopian Church autocephalous (Erlikh 2002).

The spread of Islam in Egypt and the region added another dimension to the religious link between Egypt and Ethiopia. Islam gradually unified the region of the Middle East and North Africa (MENA) but could not reach the Ethiopian highlands because of the “Nubian Dam”. The Muslim-majority Egypt perceived Christian Ethiopia as the “other”. The Ethiopian view of Egypt was more ambivalent. On one hand, Egypt was the holy land next to Palestine in which the Holy family took refuge, and where the apostle St. Mark chose to have his seat. Moreover, the Ethiopian Orthodox Church drew its metropolitans from the Church of Alexandria, and they were highly respected by the Ethiopian rulers and people. On the other hand, Egyptians were viewed with mistrust because of the control of the country by Muslim “outsiders”, as they were regarded by the Ethiopians (Tafla 2000). In the medieval period, when Egypt reached one of its historical peaks of influence and it became the centre of the Islamic Empire, the Egyptian rulers extended their influence to the Ethiopian lands (Erlikh 2002). This process was accompanied by an increase of Muslim merchants in Ethiopian society. These influences led to the spread of Islam in Ethiopia, gradually establishing a significant Muslim minority. This marked the beginning of discord between Egypt and Ethiopia as Egypt was a Muslim-majority country with a Christian minority and Ethiopia had become a Christian-majority country with a Muslim minority (Meinardus 1970).

The Nile, or the Abbay as it is called in Ethiopia, has a popular role in Ethiopian society. But its importance in Ethiopian culture is far less than that in Egypt. While the Nile’s water has been the source of life for Egyptians, its tributary in Ethiopia, the Blue Nile, has not played an equivalent role in Ethiopia. On the contrary, the strong and swift-flowing Nile has eroded the nation’s soils and has killed people and cattle (Erlikh 2002). Therefore, instead of identifying themselves with the Nile as Egyptians had done, they identified themselves primarily in terms of the Christian religion (Erlikh 2002).

However, the Blue Nile has been the most popular river among Ethiopians although they have access to other important rivers (Tafla 2000). The Nile has been a major historical asset to them and has served as their channel to retain their important connection with the Middle East (Erlikh 2002). Some of the Ethiopian legends depict the Blue Nile as the route of migration from Egypt to Ethiopia under the pressure of famine and religious oppression and as a means of communication between the rulers of the two countries (Tafla 2000). Moreover, the ancient Ethiopian traditions portray the Blue Nile as a river of two countries: Ethiopia as the source of the river and Egypt as main user of the Nile water (Tafla 2000). Therefore, the Ethiopian historical sources of the pre-nineteenth century mainly recognise Egypt as the only African state besides Ethiopia itself (Tafla 2000).

The Nile has been a significant institutional factor in relations between Egypt and Ethiopia. Egyptians have always believed that Ethiopia was the source of their Nile. Although the fact that the Blue Nile was confirmed as the main source of the Egyptian Nile only at the beginning of the twentieth century, Egyptians and their rulers from ancient times knew that the Nile water came from Ethiopia (Erlikh 2002). Moreover, Egyptians were convinced that the Ethiopians were capable of controlling or even obstructing the flow of the Nile. Ethiopia’s supposed capability to control the Nile flow was a source of pride for Ethiopians and pressure on Egyptians (Pankhurst 2000). This alleged ability of the Ethiopians

to control the Nile water and cause famine in Egypt was seen to be a perpetual threat by the Egyptian rulers (Winter 2008). Although this alleged capacity has never been technologically available until very recently, awareness of the possibility has significantly influenced the history of the relations between the two nations.

The medieval period represented the main formative period for Egyptian–Ethiopian relations. During this period, these relations assumed special significance when the two countries were both very powerful. Egypt was the center of the Mameluke Sultanate, which was very strong and active in defending the Islamic empire and its institutions for almost 300 years (1250–1517). During almost the same period, Ethiopia was a powerful Christian state devoted to the development of Christianity in the region (Winter 2008). This led to the establishment of multifaceted competitive Ethiopian–Egyptian relations that revolved around religion and the Nile. While the Muslim Egypt's welfare depended on the water and silt brought from Ethiopia by the Nile, the Christian Ethiopia had very close relations with the Coptic Church of Egypt, where the Ethiopian patriarch (Abuna) was selected and appointed (Pankhurst 2000).

Claims of the Ethiopian ability to control the Nile were made by several Ethiopian rulers. Although these Ethiopian threats were not technologically possible until recently, these threats have influenced mutual perceptions. One example of the historical accounts that referred to such belief is written by Al-Qalqashandi, an Egyptian historian, who lived in the Thirteenth Century. According to him, the Nile had failed to rise in 1093 as a result of the deterioration in its riverbed coming from Ethiopia. Therefore, Sultan Al-Mustansir Billah sent the Egyptian Coptic Patriarch to the Ethiopian ruler to convince him to fix the riverbed in order to enable the Nile to resume its usual flood (Al-Qalqashandi 1418). Another version of the story is reported by Al-Makin, an Egyptian Coptic historian, who stated that the Nile's failure was the result of Ethiopian intervention. This account also claimed that once the Ethiopian king yielded to the patriarch and ordered a dam to be broken, the Nile flow increased and its level rose by three cubits in one night (Meinardus 1970; Pankhurst 2000). This belief in the Ethiopian capacity to control the Nile enabled a number of Ethiopian kings repeatedly to threaten blocking the Nile in order to achieve their political goals. Various Egyptian and Ethiopian traditions have referred to such repeated Ethiopian threats. For instance, one Egyptian account stated that the Ethiopian king Zara Yaqoub made such a threat to the sultan of Egypt Al Zahair Jaqmaq in the fifteenth century in response to his anti-Coptic actions. In a letter to the Egyptian sultan, the Ethiopian king threatened him by reminding him that the River Nile flows from Ethiopia to Egypt and that the Ethiopians were able to prevent its floods that irrigate the land of Egypt, but their belief in God had kept them from doing so (Al-Sakhawi 1643). Similarly, some of the Ethiopian accounts mention similar stories. For instance, one account claims that in the thirteenth century the Egyptian ruler refused to pay the accustomed tribute to Ethiopia. Therefore, the Ethiopian king prayed for God to stop the Tekeze, one of the tributaries of the Nile, for 3 years and 7 months. Egypt reportedly suffered from famine until its ruler sent gifts to the Ethiopian king begging him to resume the Nile flow (Pankhurst 2000). Although these accounts are not fully verifiable historically, they reflect the belief on the parts of both Ethiopians and Egyptians in the Ethiopians' ability to control the Nile.

An interesting point is that not only the Egyptians and the Ethiopians believed in the ability of Ethiopians to control the Nile but also European powers in the medieval period held the same belief. The Portuguese rulers had the control of the Nile as one of the objectives of their explorations in East Africa. During the Muslim–Christian conflicts of the medieval period, Albuquerque, Viceroy of Portugal at the beginning of the sixteenth century had the ambition to conquer Mecca in order to exchange it for Jerusalem. Interestingly,

to achieve this goal he sent explorers to East Africa to establish communications with the king of Ethiopia (Hamdani 1992). His objective was to establish an alliance with the king of Ethiopia to divert the Nile from Ethiopia to the Red Sea and thus to starve Egypt (Hamdani 1992). He believed that this would lead to the collapse of Egypt, the Islamic empire's leading power at that time, and hence the conquest of Mecca would be possible.

If the Nile was the Ethiopian card, however, then the Egyptian card was the ability of the sultan or the Coptic patriarch to delay or avoid consecrating an Abuna (Erlikh 2002). Several historical accounts have emphasised that the Abuna's consecration depended on Egyptian goodwill and efficiency. Ibn Fadl Allah Al-Umari, a historian who worked as a chancery official in Cairo and Damascus in the Fourteenth Century, emphasised that the Ethiopian bishop could be only consecrated by the Egyptian Coptic Patriarch upon a request accompanied by precious gifts from the Ethiopian king. He added that Ethiopians had always claimed that they maintain the Nile riverbed and enhance its flow to satisfy the Egyptian sultan (Al-Umari 1421).

Several attempts were made to increase the number of bishops in Ethiopia, but to ensure the dependence of the Ethiopian Church on the Coptic Church of Alexandria, the Abuna was not allowed to consecrate more than seven bishops. If the Ethiopian Church had twelve bishops, the number necessary for the enthronement of a patriarch, the Ethiopians could have separated from the Alexandrian Church (Meinardus 1970). The fact that the Egyptian rulers had the power to deprive Ethiopians of their Abuna, their top religious leader, who had a powerful and highly respected status in the Ethiopian society, was a source of friction between the two nations on a number of occasions in their common history, especially in the medieval period.

Another factor that increased the sensitivity of the relationship between Egypt and Ethiopia was the problem of their reciprocal minorities. The conditions of the two minorities, Christian minority of Egypt and the Muslim minority of Ethiopia, were closely linked in the two countries (Meinardus 1970). This link has taken various forms. Firstly, the authority in one country used to make its religious minorities victims or hostages when their coreligionists were being oppressed in the other country (Winter 2008). Another form was the emphasis of Ethiopian rulers in their correspondence with their Egyptian counterparts on the good treatment received by their Muslim minority. This was a concealed threat that it could be reversed. As reported above, when the Egyptian Sultan Jaqmaq committed a series of anti-Coptic acts, he was threatened by the Ethiopian king with blockage of the Nile. In addition, he reminded the sultan about his ability to retaliate by maltreating the Muslims who were living in the Ethiopian lands (Al-Sakhawi 1643). According to Al-Makin, when Sultan Al-Mustansir Billah threatened to destroy Coptic churches, the Ethiopian king threatened him that he would retaliate by demolishing Mecca and sending its stones to him (Erlikh 2002). The positive side of this dimension of Egyptian–Ethiopian relations was that it allowed the two minorities to enjoy good treatment most of the time. The Coptic Egyptians and Muslim Ethiopians maintained a respected status in their countries. Interestingly, Ethiopian and European accounts highlighted the special treatment that the Ethiopian pilgrims to the Holy Land received from the sultans of Egypt. According to various accounts, Ethiopians were the only pilgrims exempted from tribute when passing through Egypt to the Holy Land. Moreover, they were allowed to carry the cross uncovered in their journey though Egypt (Munro-Hay 1997).

The contention over hydrological and religious links between the two countries has continued to modern times. When Khedive Ismail, who ruled Egypt from 1863 to 1879, attempted to attain regional Egyptian hegemony, he focused on the Nile Basin (Hatina 2008). The efforts of Khedive Ismail to create this Egyptian empire were partly induced by

the motive of securing the Nile sources (El-Atawy 1996). Egypt planned to dominate the central African plateau by establishing a network of garrison stations from the Red Sea to the inland areas around Lake Victoria (El-Atawy 1996). When Egyptian forces attempted to conquer Ethiopian territories, the Ethiopian ruler sought support from the Europeans claiming that the Egyptian invasion was an Islamic threat to Christian Ethiopia. The European powers ignored him, however, and implicitly supported the Egyptian Khedive (Hatina 2008). Although this attempt failed in 1876, it led to a rise in Ethiopian nationalism against Egypt (Tafla 2000). This initiative of the Ethiopian king to identify a new religious narrative to gain the support of the Christian West weakened the religious links between the two nations and projected Ethiopians as a “distant other” in the minds of Egyptians.

In summary, the informal institutions that have characterized the Egyptian–Ethiopian relations have been shaped by two main determinants: the Nile and religion. With regard to the Nile, two informal institutions can be distinguished. The first is that both countries have believed in their superior rights to the Nile water. The unlimited use of the Nile water by Egyptians and its crucial importance to their lives have led to Egyptians having a belief in their historic rights to the water of the Nile. At the same time, Ethiopians have always believed that they have superior rights over the Nile because they have its main source in their territories. This has resulted in conflicting perceptions over the ownership of the Nile. In other words, there has been a conflict between the informal institutions that dedicate the ownership of the Nile water between the two nations. The second Nile-related informal institution is the belief of both nations in the Egyptian dependence on the Ethiopian Nile floods. Although such dependence, if it were to be true, could have been employed for the benefits or harm to Egypt, the repeated Ethiopian threats to divert the floods of the Nile has led to view Egyptian water dependency on Ethiopia as an elemental risk. Thus, the two countries are linked but also divided by the Nile (Pankhurst 2000). With regard to religion, the Ethiopian religious dependence on Egypt is the main informal institution. However, this religious dependence has been negatively affected by the political competition between the rulers of the two countries.

Positive impact of informal institutions on the relations between Egypt and Sudan

The Nile and Islam have been the most significant factors in the relations between Egypt and Sudan, both having positive impact. The absence of competition between the two countries over the river until the twentieth century made the Nile a source of cultural proximity. Later, with the spread of Islam in the territories of Sudan, Islam became a major link and common factor between the two nations.

Although the Nile is the primary source of water for Egyptians and Sudanese, they have never been in competition for its water until the twentieth century. Although the Sudanese territories received the Nile flow before Egypt, the strength of the water flow and the severity of the climate hindered the peoples of Sudan from exploiting its benefits (Powell 2000). Egypt has always been the main consumer of the waters of the Nile while Sudan was only able to develop limited rain-fed crop production using simple irrigation techniques. The Nile has also been a significant waterway for travel and communications from Egypt to Sudan and vice versa but in the modern era it has not conveyed significant trade. There has been significant cultural interaction between peoples who lived in the Egyptian and Sudanese territories.

Islam did not deeply penetrate the territories of Sudan until the eighteenth century. Since that time, it has become a major bond between the two nations. The Nubians, the

Christians with military skills who lived to the south of Egypt, stopped the Arab expansion into the territory, now known as Sudan. This “Nubian dam” slowed the Arabisation and Islamisation of the territory (Ayalon 2000). Another reason for the delay of the penetration of Islam to the territories of Sudan was the widespread poverty and lack of resources. Even when Egypt had the necessary power to occupy Sudan in the Middle Ages, its ruler abandoned the idea after sending an exploratory mission to assess the feasibility of such military expansion (Al-Umari 1421).

Thus, Islam could not have been institutionalised in Sudan until Ottoman Egypt invaded Sudan in 1821 (Erlich and Gershoni 2000). Egypt controlled most of the territories of Sudan from 1821 to 1885, 3 years after the British colonisation of Egypt. Sudan was re-occupied by the British forces in 1899 although nominally it was subject to joint control by the Anglo-Egyptian authorities (Powell 2000). Despite the nominal Egyptian control, Egyptian nationalists regarded Sudan as a historical, geographical, and religious part of Egypt (Powell 2000). For the Egyptian people, given the geographic proximity and the common spiritual background of the two regions, Egypt and Sudan were irrevocably connected by the bonds of Islam and the Nile (Powell 2000). However, the ascendancy of Egyptian culture led to the emergence of a movement on the part of sections of the Sudanese elite which opposed Egyptian influence in Sudan. The balance of power between the supporters of Egypt and those who oppose its influence has been a major determinant of the direction of the relations between these two countries over the last two centuries.

Neutrality of informal institutions between Egypt and Uganda

Contacts between Egypt and Uganda have been relatively recent compared with the consistent historical relations with Sudan and Ethiopia. The Nile and religion, the main determinants of the relation between Egypt and both Ethiopia and Sudan, played a softer role in the historical relations between Egypt and Uganda. Furthermore, this lack of consistent contact between the two societies and the soft influence of the Nile and religion have created a feeling of neutrality and prudence that characterised the modern contacts between the two societies.

The Nile softly determined the migration patterns that formed the modern Ugandan society since the middle ages. Although Uganda been inhabited since as early as the fourth century BC, the roots of modern Ugandan society can be traced back to the fourteenth century BC. The favourable climate, high altitude and reliable rainfall in Ugandan territories attracted early migrations of cultivators in central Africa since fourth century BC (Kabanda 2016). These cultivators multiplied over centuries and developed kinship-based social organisations headed by clan chiefs (Kabanda 2016). However, it was not until the thirteenth to fifteenth century AD that the earliest kingdom was established by pastoral rulers called Chwezi (Kabanda 2016). A major milestone in the formation of the social and political organisation of Ugandan society was the migration of Nilotic-speaking tribes from Southern Sudan into north-western parts of Uganda during the fifteenth or sixteenth century AD (Karugire 1980; Kabanda 2016). These migrant groups displaced the Chwezi to the southwest and established small kingdoms that spread around the equatorial lakes (Kabanda 2016). These kingdoms relied mainly on agriculture and to a lesser extent on cattle as economic activity and social organisation determinant (Atkinson 1989). Among these kingdoms, two strong competitive kingdoms can be distinguished in northern Uganda, Bunyoro and Buganda (Karugire 1980). The kingdom of Buganda represented the major polity in Uganda and its elite controlled the north-eastern area of Lake Victoria by the

nineteenth century (El-Atawy 1996). Buganda had a strong central government that was able to benefit from the fertility of the land develop a rain-fed agriculture sector, achieve advances in construction, and mobilise a strong army (Mahajubu et al. 2019).

Abrahamic religions began to spread swiftly in Uganda in second half of the eighteenth century. Although Islam reached Buganda several decades before Christianity, the later has become dominant by the end of the century. Although Muslim traders had sporadically reached Uganda through the East African coast since the beginning of Islam, it was not until the 1840–1850 s that Muslims began consistently to come to Buganda under reign of King Suna I (Oded 1974). During the 1840s, Islam expanded softly by Muslim traders as they avoided confrontations to maintain the flow of their trade (Kasozi 1974). After a slowdown between 1852 and 1865, Islam expansion regained its momentum in Buganda to reach its peak in 1875 under the reign of King Mutesa, who declared himself as a Muslim (Kasozi 1974). However, upon forming informal alliance with the Welsh explorer H.M. Stanley in 1875, Mutesa invited the Anglican and Roman Catholic Christian missionaries gradually expanded Christianity (Rukuuka 2005). By the end of 1880 s, equal halves of the Bugandan population were converted to Protestantism and Catholicism (Green 2008). After a decade of unrest Muslims and Christian Baganda for a decade, Christianity gradually expanded to become the religion of majority in Uganda since 1890s (Oded 1995).

This gradual flow of Nilotic tribes' migration to Uganda and their relatively peaceful absorption of both Christianity and Islam are believed to cement a more ancient indirect link between Uganda and Egypt. Although there is no archaeological evidence confirming ancient contact between Egypt and Great Lakes, human contact has been suggested based on the existence some common cultural practices, domesticated animals, and power structures between the two civilizations (Reid 2003). For example, the observation of lunar ceremonies is an example of cultural practice that has been central to both civilizations. The modern existence of long-horned cattle and plank-sewn boats in Uganda, similar to those recorded in ancient Egyptian art has been interpreted as an evidence of a cultural diffusion process via the Nile. The perception of the king as embodiment of the society has been considered as a signal of the similarity in power structure in the two civilizations. This commonalities between the two cultures suggests a soft ancient bi-directional link between them. However, neither the ancient contacts, the medieval migratory flow, nor modern religious absorption established a significant direct link between the two societies.

However, the absence of a significant direct link made both societies conservative in their first direct interaction toward the end of eighteenth century. By that time, a powerful government enabled Buganda to extend its domain and to defeat its traditional rivals, mainly Bunyoro, and thus came in contact with Egypt which was also extending its domain (El-Atawy 1996). During the first half of the eighteenth century, various Egyptian expeditions attempted to reach the source of the White Nile but failed. It was not until 1863 that a British geographer, Samuel Baker, reached the waters of Lake Victoria. In 1870, the Egyptian Khedive Ismail sent Baker as the head of an Egyptian expedition to suppress the slave trade and occupy the equatorial regions as an Egyptian province (Collins 1990). Egypt succeeded only in extending its control to the regions of South Sudan in 1874. As the Egyptians were very cautious of their lack of understanding of the Ugandan society and territories, they relied on more peaceful means to dominate the Lake Plateau. Arriving in the Equatorial Lakes region. However, Egypt failed to convince the king of Buganda to accept Egyptian protection while maintaining control over his kingdom. Subsequently, the Bugandan king sought an alliance with the Egyptian authorities on equal footing while providing the necessary support against his local enemies. On the other hand, the British commander of the Egyptian forces did

not want to engage in local conflicts. Therefore, the Egyptian control was limited to the regions that are located to the north of Lake Victoria and lasted until 1889. Although the two parties failed to reach a lasting agreement of alliance, they succeeded in avoiding significant military confrontations (El-Atawy 1996). Later, the British followed the Egyptian strategy and formalised an agreement that allowed the Bugandan elite to play the role of the local administrators for the British colonisation while keeping their traditional institutions and power (Thompson 2003).

To conclude, the role of the Nile and religion played a softer invisible role in the historical link between Egypt and Uganda. Thus, their role in shaping the informal institutions of their bilateral relation is less influential than theirs in the case of the Sudan and Ethiopia. The relatively short history of the direct relations between Egypt and the Ugandan population has resulted in the two societies lacking knowledge about each other. The Egyptian rulers and the rulers of the major Ugandan tribes did not have a clear assessment of the value of their related hydrological interests. Thus, two informal institutions marking Egyptian–Ugandan relations can be distinguished: “neutrality” and “prudence”.

To conclude, the two informal institutions *religions as identity* and *ownership of the Nile* played different roles in the Nile-related relations between Egypt, Sudan, Ethiopia and Uganda over history. These interactions developed particular water-related informal institutions that shaped the mutual perception of the three societies on their water-related relations. The Egyptians and Sudanese perceived each other as “brothers”. Egyptians and Ethiopians have maintained perceptions of each other as “the competitive others” over water. Only Egyptians and Ugandans have been relatively free from water historical perceptions as they had never had deep historical contacts (Fig. 6).

Fig. 6 Institutional structure of the Nile Basin-physical environment and informal institutions, 1882

Formal institutions

There was no formal inter-state institutional framework regulating the relations among riparian countries over the Nile Basin by the end of the nineteenth century. On the regional and bilateral levels, most of the Nile Basin riparian countries had not yet come into existence or were still in the early phases of establishment. Therefore, there was an absence of any bilateral or regional treaties. On the international level, the law of non-navigational uses of international waters was in its infancy.

Three major events occurred mainly in the third quarter of the nineteenth century that raised significantly the importance of the Nile for the major European powers: the discovery of the source of the Nile at the mouth of Lake Victoria in 1862; the opening of the Suez Canal in 1869; and the 1876 financial collapse of Egypt, which had been the major user of the Nile water (Collins 1990). These three events paved the way for foreign intervention in Egypt, resulting in the British colonization of Egypt in 1882 that lasted until 1954. As a result, Great Britain played the main role in establishing the regulatory framework that governs the Nile until today, designing it to serve mainly its own political and economic interests. This regulatory framework was developed in two phases. The first phase conducted through a series of treaties aimed at establishing legal regulation of the distribution of the Nile water among the riparian countries. The second phase sought to establish technical and legal regulation of the Nile water to increase the efficiency of its use.

First phase: 1882–1929

Although Great Britain's intervention in Egypt was motivated at the beginning by its interests in the Far East, it later developed genuine interests in the Egyptian agricultural sector that led its foreign policy in the whole Nile Basin. After the colonisation of Egypt, Great Britain discovered additional reason for reinforcing its position in Egypt, which was securing sufficient imports of Egyptian cotton to supply the textile industry in Manchester (Tvedt 2004). Since the annual discharge suffered a secular decline and Egypt was reaching the limits of its water, Britain decided to expand southwards to secure the existing water sources and to attempt to increase them in the future (Tvedt 2004). Therefore, Great Britain declared the whole Nile Valley its exclusive sphere of influence in 1890 to prevent other European powers from acquiring territories in the Nile Basin (Woldetsadik 2013). By the end of the century, the British imperialist strategists established a British Nile imperialist system, aimed at securing British interests. The immediate objective of the British was to protect Egypt's irrigated agricultural sector (Waterbury 2002). After the Anglo-Egyptian occupation of Sudan in 1899, the British government extended its geopolitical interests in the basin to include Sudan because of its potential for cotton cultivation to supply the British domestic textile industry (Waterbury 2002). Ugandan hydroelectric interests became a priority for the British Administration in Uganda by the 1940s (Tayia 2015).

Thus, the British Government exerted extensive diplomatic efforts to set up a comprehensive formal institutional structure regulating the Nile in order to replace the historical informal institutions. To achieve this goal, a series of treaties were included in the Nile Basin institutional structure in the first half of the twentieth century. As a result, Egypt succeeded in strengthening the informal institution of its historic rights in

the Nile water with new formal institutional structures governing the Nile Basin based on the prior appropriation doctrine. Three treaties were developed by the Great Britain and different interested parties in 1891, 1902 and 1929.

The first treaty was concluded between Great Britain and Italy in 1891. This treaty permitted Italy to colonise the coastal part of Ethiopia, which later became Eritrea. In return, it guaranteed the Egyptian interest of securing its normal flow of the Nile water from the Atbara River, a tributary of the Nile that comes from Eritrea (El-Atawy 1996).

The second treaty was signed by Great Britain and Ethiopia in 1902 to delineate the frontiers between Anglo-Egyptian Sudan and Ethiopia. Great Britain acted on behalf of the Anglo-Egyptian Sudan, that is, it acted for itself as the co-governor of Sudan and for Egypt, as the other co-governor of Sudan. Great Britain and Ethiopia signed this treaty which was intended to delimit the borders between Sudan and Ethiopia and guarantee their respective interests. Based on this treaty, Ethiopia received the British recognition of its sovereignty and its borders with Anglo-Egyptian Sudan (El-Atawy 1996). In return, limitations were established on the Ethiopian control of the Blue Nile. Ethiopia committed itself not to construct or allow the development of any project across the Blue Nile, Lake Tsana or the Sobat, which would arrest the flow of their waters into the Nile without an agreement with the British government and the government of Sudan (International Law Commission 1974).

The treaty of 1929 was signed by Egypt on behalf of itself as independent state, and the United Kingdom, on behalf of both Sudan and the British colony of East Africa. In this treaty, Egypt, after achieving its partial independence in 1922, had to defend its hydrological interests against the United Kingdom which defended the interests of Sudan and Uganda. The treaty gave Egypt the right to maintain its normal flow of the White Nile water and veto any upstream project on the White Nile that it believed would alter the flow of the Nile (McKenzie 2012). Sudan acquired a new position as the second appropriator of the Nile water, allowed to appropriate around 4 billion cubic metres of the Nile water. Since Uganda had been interested mainly in the hydropower generation from the Nile water, the British government was keen to support the Ugandan hydropower plans. Although Uganda's appropriation rights were restricted, the treaty included provisions to provide the necessary support to establish its future hydroelectric projects.

These treaties that have mainly regulated the appropriation rights of the riparian countries have been based on one of the major international doctrines, the prior appropriation doctrine. The doctrine of prior appropriation was derived from the so-called master principle of appropriation, or of senior or acquired rights, that was inherited from the water law of the western United States (Waterbury 2002). This principle dictates that the one who uses water first establishes a right to it: "first in time, first in right" (Spiegel 2005). This doctrine protects the prior appropriation rights against all second-in-time users to avoid actions that might harm those with senior rights (Waterbury 2002). In other words, this doctrine holds that the senior water right must be fully fulfilled before the next most senior water right is fulfilled (Spiegel 2005). In this way, Egypt and the United Kingdom succeeded in legally securing the historically acquired Egyptian rights to the Nile while providing Sudan new rights to Nile water and guaranteeing Uganda the right to develop its hydropower projects.

Second phase: 1929–2010

By the end of the nineteenth century, it was clear that Egypt needed not only to maintain its natural share of the Nile, but also to find technical solutions to increase its water supply. The treaty of 1929 secured Egypt's acquired rights of water, estimated to be 48 billion

cubic meters. Furthermore, the treaty paved the way for cooperation among the riparian countries to establish storage projects in upstream countries to provide the upstream countries with hydropower while increasing the utilisable water for downstream countries. Based on a series of studies by Egyptian and British experts, Egypt sought to set up water conservation projects inside and outside its borders to increase the utilisable water of the Nile.

In 1949, the Egyptian government and the British administration in Uganda signed a treaty that permitted Uganda to establish a dam on the Owen Falls with the main purpose of hydroelectricity generation. Egypt agreed to provide the necessary technical assistance to Uganda to build and operate the dam. Egypt also agreed to provide financial assistance of around 3.65 million pounds sterling to the Ugandan authorities to build the dam in return for raising the level of Lake Victoria by 2–3 m to store the necessary water for Egypt during the dry season. In parallel, efforts were taken to conclude a similar treaty to build a dam on the mouth of Lake Tana but the negotiations failed. This triggered a new stage in the Nile-related relationship between Egypt and Ethiopia. The two nations failed to reach a compromise solution that served their interests. Each of them claimed to have ownership rights to the Nile water and made attempts to unilaterally pursue their own plans.

After the independence of Egypt in 1956, Egypt initiated the High Dam project that could allow Egypt to control the Nile flow to release timely water that could be utilized more efficiently in irrigating additional agricultural lands. It was estimated that Egypt and Sudan used annually nearly 50 billion cubic meters of the Nile water while 34 billion cubic meters flowed into the Mediterranean Sea on average (Hurst et al. 1966). Not only did this new dam increase the annual utilizable water but it also provided Egypt with hydropower. The increased available water was allocated to Egypt and the Sudan by an agreement signed in 1959. This agreement estimated the mean annual discharge of the Nile based on the measured annual flows over the period 1900–1959 to be 84 billion cubic meters. The water loss as a result of evaporation in the High Dam reservoir was estimated to be about 10 billion cubic meters per annum. Egypt was granted an additional share of water of 7.5 billion over its established rights under the treaty of 1929. Thus, its total share reached 55.5 billion cubic meters. Sudan was granted an additional share of 14.5 billion cubic meters to raise its total share to 18.5 billion.

As a reaction of the High Dam project in Egypt and the negotiations between Egypt and Sudan that led to the treaty of 1959, the Ethiopian government declared in its official newspaper on February 1956 that Ethiopia would reserve its right to utilise the Nile waters originating in its territories (Collins 1990). Ethiopia followed this declaration by sending an official note to the diplomatic missions in Cairo emphasising that it reserved the right to use the Nile water sources in its land to the benefits of the Ethiopian people (Collins 1990). Additionally, Ethiopia attempted to repudiate the treaty of 1902, claiming that the Italian occupation of 1938 and the British acceptance of it made the treaty invalid. However, Great Britain opposed this reasoning and emphasised that the Nile-related Article 3 was a part of the treaty of 1902, which was a boundary treaty that could not be abrogated by the occupation of Ethiopia (Tvedt 2004). Subsequently, Ethiopia did not express opposition to the historic and legal Egyptian and Sudan rights, except in rare occasions. However, Ethiopia resorted to a strategy of unilateral development of hydropower projects. Ethiopia constructed three hydropower dams, Finchaa, Tekeze, and Tana Beles, without consultation with Egypt and Sudan. Both countries have tolerated the unilateral Ethiopian actions as these dams have not represented a source of significant harm to them. However, this led to the escalation of Ethiopian unilateralism that reached its peak with the unilateral Ethiopian declaration of constructing the Grand Ethiopian Renaissance Dam in 2011. As

a result, unilateralism has become a complementary Ethiopian informal institution that has dictated its transboundary water.

In sum, this phase has in practice witnessed major positive changes in the relations between Egypt, Sudan and Uganda that have significantly affected the Nile Basin institutional structure (Fig. 7). Major changes occurred during this period as a result of the integration of the treaties of 1949 and 1959 into formal institutions that govern the Nile. Sudan gradually increased, with the coordination of Egypt, to eight irrigation and hydropower dams. Similarly, Uganda added, with the consultation of Egypt, to two major hydropower dams as well as more than twenty-five micro hydropower dams. The prevalence of unilateralism as dominant Ethiopian transboundary strategy has not only hindered the attempts of cooperation between Ethiopia and Egypt, but also to contributed to the halt of the evolution of the Nile regulatory regime as a whole despite the growing needs of riparian countries to use water for development.

Nile riparian countries have been influenced by the historical relations, and have suffered from a compound water–development challenge. With regard to the water challenge, all riparian countries have suffered from different degrees of water scarcity. Egypt has suffered from physical water scarcity while the rest of the Nile riparian countries have suffered from economic water scarcity (IWMI 2007). In addition, the water challenge has been compounded by the developmental challenges faced by all Nile riparian countries. They have been suffering from three major challenges: poverty, population growth, and climate change. Firstly, the Nile Basin has been one of the poorest regions of the world with more than 70% of the population relying on the agricultural sector for livelihood (Mohamed and Loulseged 2008). Furthermore, the Nile countries have been experiencing an expanding population growth. The population of some riparian countries, such as Egypt, is expected to double between 1990 and 2025. Even worse, Kenya's population in 2025 is expected to reach almost five times its 1975 population. Finally, climate change

Fig. 7 Institutional structure of the Nile basin, 2010

is predicted to cause changes in the timing and amounts of rainfall that exceed the natural variability (Hulme et al. 2001). This water-development challenge has aggravated historically influenced divergence between downstream countries and upstream countries.

Pattern of distribution of Nile water benefits

This section explores the pattern of distribution of Nile water benefits using the third analytical component of IAAA model, i.e. the pattern of distribution of CPR benefits. All four countries increased their benefits of the Nile water. While the quantity of water that Egypt utilizes of Nile water rose, its share Nile water declined. The quantity of Nile water utilized by Egypt increased from about 39 billion cubic meters in 1882 to 55.5 billion cubic meters since the operation of Aswan High Dam in 1976. However, its share of Nile water declined from about 97.5%–75%. Furthermore, the construction of the Aswan High Dam has enabled Egypt to benefit from 2100 Mega Watt of hydroelectric power generated using Nile water. Sudan was able to increase not only its Nile water quantity but also its Nile water share. Sudan raised Nile water quantity available to its use from 1 billion cubic meters in 1882–18.5 billion cubic meters since 1976. This increase meant that its Nile water share rose from about 2.5 % to about 25 % over the study period. In terms of hydroelectric power generation, the major Sudanese dams on the Nile–Sennar, Roseires and Merowe–have provided Sudan added an average of 1150 Megawatt to power generation capacity of Sudan. The three major dams established by Ethiopia on the Nile, Fincha, Tekeze and Tana Beles, have added an average of about 880 Megawatts to Ethiopia's Power generation capacity. The three major dams constructed by Uganda on the Nile–Bujagali, Kiira and Nalubaale–have provided it with hydroelectric power generation capacity of about 630 Megawatts.

Discussion

The examination of the history of cooperation among riparian countries has demonstrated that the informal institutions have influenced their interactions, with varying consequences. On the positive side, informal institutions have sometimes been a catalyst for cooperation between Egypt and Sudan. The deeply-rooted positive informal institution of the between the Egyptian and Sudanese nations has helped both countries to overcome differences that occurred from time to time regarding Nile water utilisation. On the negative side, informal institutions have been a major obstacle in the common history of Egypt and Ethiopia over the Nile ownership. Egypt has been willing to contribute to the development of a regulatory regime that supports the development needs of other riparian countries. This was materialised in a series of agreements and irrigation and hydropower projects in Sudan and Uganda. On the contrary, the conflict over the Nile ownership and the persistent Ethiopian unilateralism have significantly contributed to the escalation of water-related tensions between Egypt and Ethiopia.

This conflictual heritage has impeded endeavours to collaborate to maximise the potential shared benefits from the Nile water. Although the influence of informal institutions was softened in the first phase of the study period because of the British hegemony over the basin, it began gradually to influence the bilateral interactions between Egypt and Ethiopia with the gradual British withdrawal from Egypt and the Nile Basin. Finally, the neutrality

of informal institutions that characterised Ugandan-Egyptian relations during the British colonisation enabled the British administration to lead successful negotiations that resulted in the treaty of 1929. Even when Egypt gained its partial independence, both countries managed to reach a cooperative agreement over the Owen Falls Dam. However, this does not imply that cultural heritage has been the sole determinant of the interactions among riparian countries as water-development challenges have been pressing on all the Nile riparian countries. A future research which analyses how cultural factors interacted with the water-development needs of each riparian country in the process of cooperation in the Nile Basin in past decades is underway.

However, bearing in mind the degree of influence of informal institutions on the dynamics of cooperation in the Nile Basin, changing the informal institutions that are prohibitive to cooperation should be seen as a prerequisite on which to build sustainable cooperation. Since informal institutions are persistent and slow to change, a good strategy to deal with them is to attempt to attenuate their negative effect while working on changing them gradually over time. The growing secularisation of the Nile basin countries could facilitate this change process.

Collaboration between riparian countries should be a continuous conflict transformation process that deals with the socio-economic challenges in the Nile Basin (Bitsue 2012). This conflict transformation process should aim to deeply transform in the deep-rooted sources of conflict in order to establish a stable structure of relationships among the riparian countries (Tayia 2019). Tackling the problem of the conflicting informal institutions among peoples of the Nile Basin will facilitate the work of negotiators and representatives of riparians in the strategic interactions between them. Informal institutions are a cultural problem that has economic roots (North 1990). Therefore, it needs to be addressed through various channels of cultural and economic exchange, such as the media and education, as well as through explicit economic and technical cooperation. Media and communication could serve as a fast-track strategy to weaken the negative impact of the historical impediments.

The second avenue to address informal institutions is education. Education can establish a solid base for cooperation among riparian countries by providing younger generations with the facts about the links between riparian nations and correcting inherited misconceptions. Another important avenue is economic cooperation outside the field of water in for example international trade which invisibly mitigates the existential challenge of water scarcity. Economic exchange is not only important to build common interests among the riparian countries, but it also has been the oldest mode of cultural interaction.

Conclusions

The study has analysed the evolution of the historical Nile basin governance regime. A more specific objective has been the identification of the role of cultural beliefs that have shaped the governance regime of the Nile basin. The analysis of the historical interactions among riparian countries has revealed the influence of the cultural beliefs on the interactions of Nile riparians especially the relations of the Eastern Nile countries, Egypt, the Sudan and Ethiopia. On the positive side, cultural beliefs have been a catalyst for cooperation between Egypt and Sudan, on the contrary, the conflict over the Nile ownership has negatively influenced historical Ethio–Egyptian relations. It is suggested that the inter-riparian cooperation to establish a basin-wide management regime should continue as a

gradual process. This process must soften the negative impact of the inherited beliefs while working on changing them gradually over time.

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