The Nile Agreement of 1929: Legal and Economic Analysis

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Abstract

The Nile Agreement of 1929 established two substantive rules. First, it granted Egypt the exclusive property rights over the waters of the River Nile based on prior use. According to Coasian analysis, such a framework would have been efficient because, historically, it would have been difficult to define water rights in the Nile Basin, where most riparian countries were not sovereign and not clearly demarcated. Also, relative to other riparian countries, Egypt had invested more on irrigation than its counterparts. Second, the property rule was enshrined in the Agreement to legally protect Egypt's established property rights. In retrospect, use of property rule, coupled by the fact that the Agreement did not impose Egypt with any obligation towards other riparian countries, renders the Agreement inefficient because it empowered Egypt to monopolize the utilization of the Nile waters.

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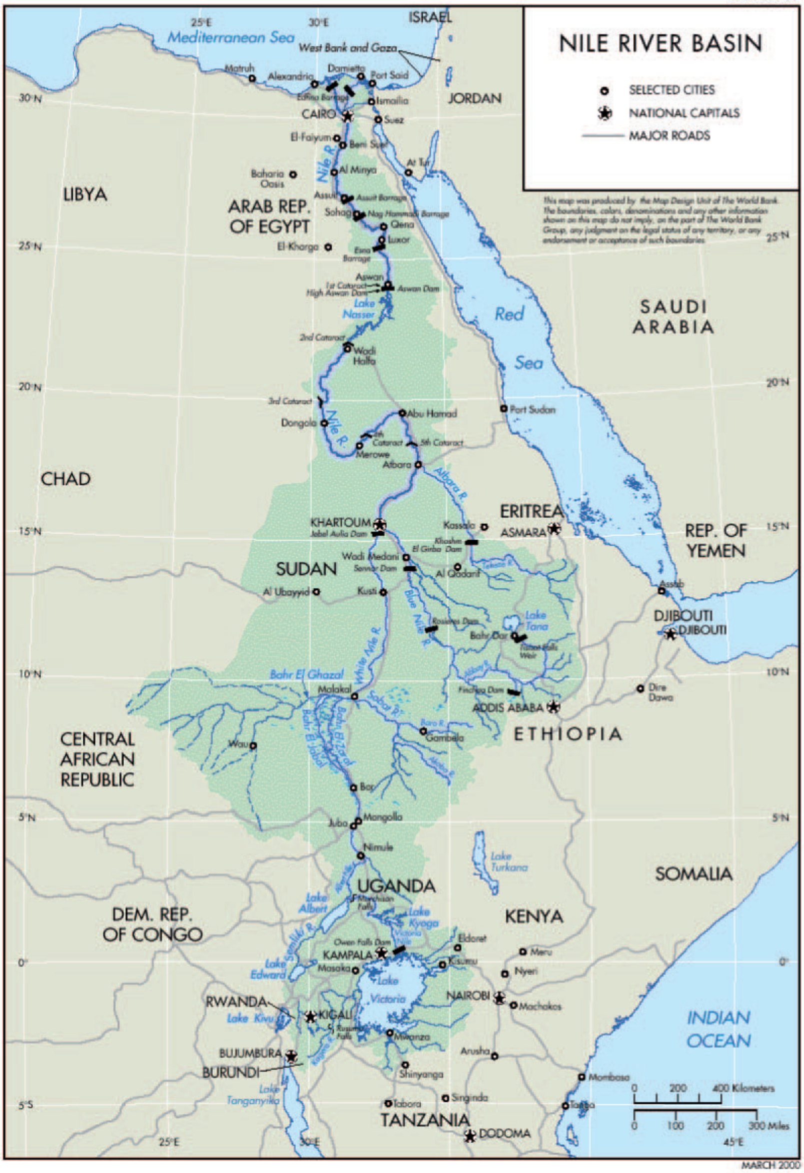

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1. Introduction

Notwithstanding an extraordinary natural endowment and rich cultural history, the Nile Basin faces considerable challenges, which include water scarcity, poverty, environmental degradation and insecurity. The population in the Basin is expected to double in the next 25 years, further constraining access to water and other resources. The Basin's recurrent droughts and desertification has escalated water scarcity, and has increased possibilities of water conflicts. The governing legal framework (Godana, 1985; Okidi, 1982; and Caponera, 1993) on the utilization of the Nile waters cannot adequately address these challenges, and this could potentially lead to conflict (Carrol, 2000; Starr, 1991; El-Fadel et al., 2003). While Egypt's military dominance and its use of threats has muted previous tensions over Nile waters, the current usage of the Nile water is unsustainable largely due to population growth, and the fact that the volume of water has been decreasing.

The legality of the Exchange of Notes Regarding the Use of the Waters of the Nile for Irrigation of 1929 [hereinafter 'Nile Agreement] between Egypt and the United Kingdom [hereinafter UK] is an issue.[1] The agreement is problematic because it gave Egypt exclusive property rights[2] over the Nile waters with no obligations to the other riparian countries except Sudan.[1] Egypt claims 65 per cent per year of the total flow of Nile waters measured at Aswan Dam, and makes no contribution. While the legality of the Nile Agreement remains unsettled, it has never been legally challenged. It is thus the legal basis of water allocation in the basin (Godana, 1985).

This study provides an analysis of the allocative mechanism of the Nile Agreement from the perspective of law and economics, and offers two substantive arguments. First, the established right principle of the Nile Agreement was efficient because it is consistent with the Coasian Analysis and Posner's Assignment Principle (Coase, 1960 and Coleman, 1988). The article conjectures existence of transaction costs that made it improbable to have a regional agreement prior to the conclusion of the

[1] Exchange of Notes Regarding the Use of Waters of the Nile for Irrigation Purposes, May 7, 1929, Egypt-U.K., 93 L.N.T.S. 43 [hereinafter 1929 Exchange of Notes].
[2] United Arab Republic and Sudan Agreement (with annexes) for Full Utilization of the Nile Waters, November 8, 1959, United Arab Republic-Sudan, 453 U.N.T.S. 6519 [hereinafter The 1959 Agreement].

Nile Agreement. Based on pre-Nile Agreement irrigation investments, Egypt was the most efficient user of the Nile waters.

Second, protecting Egypt's property rights over the Nile waters with a property rule as stipulated in the Nile Agreement may have resulted to an inefficient outcome (Calabresi and Melamed, 1972; Miceli, 1997). The property rule conferred monopolistic access to the Nile on Egypt. Since Egypt had no legal obligation to its counterparts, the rule induced Egypt to utilize the Nile waters inefficiently. Egypt easily enforced the rule because protracted political and economic instabilities within the upper riparian countries allow Egypt to enforce rules effortlessly. Such instabilities and lack of resources left those countries so weak to challenge the rule. Moreover, Sudan was bound by the rule through an agreement with Egypt.[3]

The Nile Basin needs to address the legal question of why the Nile Agreement has failed to incorporate the interests of the upper riparian countries (Carrol, 2000). Moreover, the legality of the Nile Agreement has not been addressed because international law on the non-navigational uses of international watercourses such as the Nile is not clear.[4] Consequently, each riparian country interprets the agreement based on international legal theories that selectively support its position. Egypt upholds that the Nile Agreement binds all riparian countries under the Vienna Convention on the Law of Treaties (Godana, 1985). Sudan is bound by the agreement through the 1959 Agreement with Egypt.

The upper riparian countries take contrary views that have attracted support from several publicists (Okidi, 1982; Okoth-Owiro, 2004; Degefu, 2003). Kenya, Tanzania and Uganda declared the Nile Agreement as non-binding upon attainment of their independence from United Kingdom (Godana, 1985). Other riparian countries such as Ethiopia, Eritrea, Burundi, Rwanda and Congo were not party to the agreement.

The riparian countries' competing claims over the Nile waters pose a fundamental economic question of how to efficiently allocate

[3] United Arab Republic and Sudan Agreement (with annexes) for the full utilization of the Nile Waters.

[4] The UN Convention on the Non-Navigational Uses of International Watercourses (Adopted by the UN General Assembly in resolution 51/229 on May 21, 1997), available at http://www.internationalwaterlaw.org/intldocs/watercourse_conv.html. Also see (Carroll, 2000: 287).

the Nile waters given the increasing water scarcity. The two basic methods of allocating a scarce resource between competing users are centralized planning, and market process (Milliman, 1959). Granted the absence of these institutions in the basin, the following questions must be addressed. First, how property rights over the Nile water can be assigned and under what criteria (Calabresi and Melamed, 1972), and second what legal rule should be applied to protect the assigned property rights.

Applying economic efficiency (Posner, 1972; Miceli, 2004; Coleman, 1988; and Cooter and Ulen, 2004) as a basic criteria for allocating water rights, then the Nile Agreement retrospectively answered the preceding questions by granting Egypt the property rights based on prior use and applied property rule to protect those rights. Emphasis on economic efficiency rather than equity consideration is dictated by the nature of the problem. The volume of annual flow of the Nile varies but it has noticeably been declining over the last century (Brunnee and Toope, 2002).

Section two of this paper focuses on the institutional background of the Nile Agreement and briefly outlines the geography of the Nile Basin. It also, explains the factors that led to the conclusion of the Nile Agreement, including the considerations of Egypt and the UK. In addition, the section explores the current legal status of the Agreement. Section three highlights the two substantive rules of the Nile Agreement. It analyzes the assignment rule by demonstrating that it is consistent with the corollary to Coase Theorem (Miceli, 2004). It indicates existence of high transaction costs among the riparian countries and demonstrates that Egypt had and still has a greater use of the Nile than its counterparts, based on geography and history. Under the analysis of the property rule, the section develops a simple economic model based on the trade off of cost and benefits of utilizing the Nile waters. The model predicts that the property rule without obligation would induce Egypt to inefficiently use the Nile waters. Section four provides anecdotal evidence of Egypt's over-utilization of the Nile waters. The evidence includes land reclamation programme, loss of water from Lake Nasser through evaporation, and proposed projects for food security. Section five provides an analysis of two substantive rules of the newly drafted Agreement on the Nile River Basin Cooperative Framework[5]

[5] Draft agreement on the Nile River Basin Cooperative Framework.

and explores the reasons why Egypt and Sudan are reluctant to sign the draft agreement. Section six concludes the study.

2. Background Information

The Nile River is one of Africa's greatest assets and the longest river in the world. Throughout history, it has sustained livelihoods, an array of ecosystems and rich diversity of cultures. It drains a catchment area of about 2.8 million square kilometres, which is one-tenth of Africa's total landmass. The Nile has three main tributaries: the White Nile, the Blue Nile and the Atbara. The White Nile drains the upper riparian countries: Burundi, Congo, Kenya, Rwanda, Tanzania and Uganda. It stretches from Burundi and joins Kagera River that flows into Lake Victoria. Lake Victoria is the second largest freshwater lake in the world and rests on crux between Uganda, Tanzania and Kenya with 40 per cent, 50 per cent and 10 per cent, respectively. In addition, Lake Victoria's surface is maintained by a third of Kenya's rivers (Okidi, 1980). From Lake Victoria, the White Nile meanders through several lakes and merges with the Blue Nile at Khartoum in Sudan. It maintains a steady flow of 28 per cent of the Nile River, with water evaporation losses in the Sudan's Sudd notwithstanding (Sharpland, 1997).

The Blue Nile drains the Ethiopian highlands, carrying on average 59 per cent of the Nile waters. Unlike the White Nile, its flow fluctuates with seasons. It discharges 90 per cent of the Nile waters in the months of July-September compared to 20 per cent in the other dry months (Godana, 1985). Like the Blue Nile, Atbara rises from the Ethiopian plateau and drains parts of Eritrea before merging into the Nile River 200 miles north of Khartoum.

In 1892, the UK occupied Egypt to serve its commercial interests. It wanted to protect its interest in the Suez Canal and to address shortage of cotton in the world market (Hoskins, 1943). In early 1900s, the UK government began promoting cotton cultivation in Egypt and Sudan, then under UK-Egyptian condominium rule. Since cotton could only be cultivated in the summer, a shift from traditional seasonal flood-fed method to perennial irrigation became necessary. This shift precipitated an intensive period of water development of the Nile, which generated intense debate over the interests of upper and lower riparian countries on these development.

The UK had appointed four commissions to draw up regional development plans for exploitation of the Nile waters. Egypt rejected the commissions' plan because major structures would have been beyond Egypt's jurisdiction.

2.1 The Nile Agreement

On 7 May 1929, Egypt and the United Kingdom signed the Nile Agreement for the purpose of sharing the Nile waters. The agreement was in form of exchange notes between the Egyptian Prime Minister and United Kingdom High Commissioner, which took place in 1925 and 1929, respectively. It also includes the report of the 1925 Nile Commission.

The two countries' desire to engage on large scale projects on the Nile mainly precipitated the signing of the agreement (Godana, 1985). These projects included, among others, a proposal to construct two dams in Sudan: Gebel Aulia and Sennar dams. Viewing the construction of these dams as a threat to its interest, Egypt suspended its financial commitment to the construction of Sennar dam. Nonetheless, the Sudanese government with the assistance of the UK government completed the Sennar dam, which led to a diplomatic fallout between Egypt and Britain (Hosni, 1957). The assassination of the British Governor-General of Sudan in Cairo further escalated the fallout. To ease the tensions, the Egyptian Prime Minister and the British High Commissioner exchanged notes that became part of the Nile Agreement (Hosni, 1957).

From selected terms of the Nile Agreement, Egypt first reserved the right to renegotiate based on the future political status of Sudan, which was then a protectorate of the UK. Second, Egypt agreed to a limited increase of Sudan's water apportionment and accepted the report of the 1925 Nile Commission as integral part of the Agreement. Third, Egypt stipulated a property rule to protect her natural and historic rights over the Nile. Fourth, Egypt sought the right to construct, maintain and administer any works on the Nile in Sudan's territory subject to consultation with Sudanese local government.

The United Kingdom withdrew her mandate that had given the Sudanese government unlimited access of Nile waters to develop Gezira. Also, the UK acknowledged Egypt's natural and historical rights over the Nile based on prior use.

For 75 years, the Nile Agreement has never been invoked or applied in any former British territories after their independence (Okidi, 1980). Granted that the legality of the agreement has never been formally

challenged, the question remains whether it is still in force. Egypt's view is that pending further agreement, the Nile Agreement is valid and applicable. This position is consistent with Britain's Joint Under-Secretary of State for Foreign Affairs statement on the Nile waters.[6]

Following its independence, Sudan repudiated the Nile Agreement based on the doctrine of *rebus sic stantibus* (Godana, 1985). This doctrine allows a party to rescind a treaty if there is a material change of circumstances that transforms the rights and obligations of the treaty. Sudan argued that its accession to independence amounted to a vital change of circumstances. Later, Sudan accepted the Nile Agreement when it signed the 1959 Agreement with Egypt.[7]

Upon its independence, Tanzania formally invoked the Nyerere Doctrine.[8] In a formal declaration to the Secretary-General of the United Nations, the Tanzanian government accepted with stipulations all bilateral treaties the UK had signed on her behalf. Such treaties would remain in force on the basis of reciprocity for two years from 1960, unless abrogated or modified earlier by mutual consent (Okoth-Owiro, 2004). Tanzania also issued identical notes to Britain, Egypt and Sudan, outlining her policy on the utilization of the Nile waters. The Government of Tanzania asserted that the Nile Agreement was not binding but agreed to negotiate with all riparian states to formulate a new framework based on just and equitable principles.

Following their independence, Uganda and Kenya adopted the Tanzani approach, but they did not specifically challenge the devolution of the Nile Agreement (Godana, 1985). They instead agreed to uphold, on reciprocity basis, all bilateral treaties that were concluded by United Kingdom on their behalf for two years. If such treaties were not renegotiated or modified within the two years, they became invalid subject to the rules of customary international law. In recent times, however, Kenya government officials have demanded revision of the Nile Agreement.

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[6] Statement of the Joint Under-Secretary for Foreign Affairs, May 18, 1956, 552 House of Commons Debates (5th ser.) 2411.

[7] United Arab Republic and Sudan Agreement (with annexes) for Full Utilization of the Nile Waters, November 8, 1959, United Arab Republic-Sudan, 453 U.N.T.S. 6519 [hereinafter The 1959 Agreement].

[8] Problems of State Succession in Africa: Statement of the Prime Minister of Tanganyika 11 *The International and Comparative Law Quarterly* 1210 (1962).

3. Legal and Economic Analysis

3.1 Legal Principles

The Nile Agreement stipulates the Principle of Established Rights (Hosni, 1957), which in the agreement are referred to as "natural and historical rights". Both governments agreed upon Egypt's established rights on the Nile as legal principles. In the 1925 Exchange Note [hereinafter 1925 Note], the United Kingdom High Commissioner highlighted his government's commitment to the development of the agricultural well-being of Egypt. Specifically, the note assured the Egyptian Prime Minister that the UK, "however solicitous for the prosperity of the Sudan, had no intention of trespassing upon the natural and historic rights of Egypt in the waters of the Nile, which they recognize today no less than in the past, and giving the instructions in question to the Sudan government. His Majesty's Government intended that they should be interpreted in this sense". In the 1929 United Kingdom Exchange Note to Egypt, the United Kingdom reiterated its acknowledgment of the legal principle, and assured to uphold it "at all times and under any conditions that may arise". Furthermore, the UK considered the protection of those Egyptian water rights as fundamental principle of its policy towards Egypt.

In the 1925 Note, Egypt echoed its position that Sudan's development "should in no case be of such a nature as to be harmful to the irrigation of Egypt or to prejudice future projects, so necessary to meet the needs of the rapidly increasing agricultural population of this country". Egypt also requested the UK to withdraw its instructions that had given Sudan unlimited land for irrigation in Gezira. In the 1929 Egyptian note to the UK, Egypt reiterated its position to allow the UK to increase Nile waters allocation to Sudan so long as it "does not infringe Egypt's natural and historical rights in the waters of the Nile and its requirement of agricultural extension subject to satisfactory assurances as to the safeguarding of Egyptian interests".

The two governments collaboratively appointed the 1925 Nile Commission "with the purpose of examining and proposing the basis on which irrigation can be carried out with full consideration of the interests of Egypt and without detriment to her natural and historic rights".

Other relevant secondary sources that recognized Egypt's established rights included some of the earlier bilateral agreements between the

United Kingdom and other European powers. The common objective of these agreements was primarily to protect Egypt's interests. First, in Exchange Note between Great Britain and Ethiopia, His Majesty the Emperor Menelik vowed "not to construct or allow to be constructed, any work across the Blue Nile, Lake Tsana, or the Sobat, which would arrest the flow of their waters into the Nile". Second, the United Arab Republic and Sudan Agreement for the Full Utilization of the Nile Waters acknowledged Egypt's acquired rights and quantified them to 55.5 billion cubic meters measured at Aswan Dam.

3.2 Established Rights Principle

The Established Rights Principle is efficient because it is consistent with Posner's Assignment Principle (Posner, 1972; Coleman,1984). In cases where transaction costs impede internalization of externalities through private exchange, Posner offers an assignment principle. According to the principle, legal rule should be designed to confer property rights to the efficient user (Coleman, 1980). To demonstrate efficacy of the Established Rights Principle, this sub-section discusses two important aspects. It demonstrates and asserts the existence of high transaction costs prior to the Nile Agreement, which would have prevented a multilateral agreement in the basin; and it shows that Egypt was the most efficient user of the Nile waters based on the level of irrigation investment.

3.2.1 Existence of transaction costs

The search for cooperation over usage of Nile waters has been historically elusive because of high transaction costs. Lack of a multilateral agreement on the Nile before and after the Nile Agreement is a case in point. For example, most of preceding agreements over the Nile were bilateral in nature and were commonly signed by colonial powers on behalf of their respective territories.

When the Nile Agreement was being negotiated, most of the riparian countries were non-sovereign, except Egypt. The non-sovereign countries lacked legal standing to conclude any agreements based on international law. Furthermore, except for Egypt and Sudan, the use of the Nile waters was not a priority to other riparian countries because they practiced irrigation in small scale, if it existed at all. Even in countries where exploitation of the Nile would have been viable, they

lacked adequate capital to embark on major irrigation works. Moreover, they were politically unstable to attract foreign investment. Also, most of the upper riparian countries were facing protracted economic and political instability that compelled their governments to concentrate on daily survival rather than on planning for development of their water resources (Sharpland, 1997). Furthermore, these countries lacked adequate trained cadre of experts in hydrology and related disciplines to match Egypt's superior expertise and knowledge.

Lastly, over the years, Egypt has used its military dominance and international clout to frustrate the upper riparian countries' efforts to use the Nile waters. For instance, Egypt has in the past used her international clout to influence international institutions from financing water development plans in Ethiopia (Walilegne, 2004). Egypt has also been providing logistic support to an insurrectionist group that has worked towards destabilizing Ethiopia (Walilegne, 2004).

3.2.2 Value of Nile

Using development of irrigation as a proxy measure of the value of the Nile, Egypt valued the Nile more than her counterparts. Beginning early 19th century, Egypt was the sole riparian country to make extensive use of surface irrigation in its agricultural sector. It had been doing so for 7,000 years (Sharpland, 1997). With the advent of British control, Egypt embarked on intensive development of the Nile to improve its irrigation system. It constructed a few barrages, notably Assiut Barrage, which was constructed in 1902 at a cost of 870,000 Egyptian pounds (Willcocks and Craig, 1913). In 1903, Zifta Barrage was constructed at a cost of 265,650 Egyptian pounds. At a cost of 945,000 Egyptian pounds, Egypt completed Esna Barrage in 1908. Earlier, from 1898 to 1902, Egypt constructed the Aswan Dam. With storage capacity of 980 million cubic meters, the dam was used to store some of the autumn surplus of clean water for use in the following summer (Hosni, 1957). The construction cost was 4,220,000 Egyptian pounds with additional 136,929 Egyptian pounds to raise the dam, which was done ten years later (Willcocks and Craig, 1913). These developments led to a great intensification in land use through irrigation. By 1927, two years before the signing of the Nile agreement, Egypt had a total of 5.7 million acres (Chesworth, 1994) of cultivable land, with a population of 14.22 millions (Hurst, 1952). Today, the Nile essentially sustains Egypt's population of

68 million, with 95 per cent residing in the Nile Valley (Brunnee and Toppe, 2002).

At the dawn of the 20th century, the irrigation system in Sudan was in its embryonic stage as noted in the 1925 Commission Report. Before the Nile Agreement, Sennar Dam was the only single control work that was constructed in Sudan. It was completed in 1925 at a cost of 6,269,000 Egyptian Pounds (Hosni, 1957) and catered for 311,400 acres of cultivable land. Egypt had granted Sudan pumping rights for small scale irrigation that covered 22,836 acres. In addition, Sudan had 83,040 acres of land on basin irrigation.

With the exception of Owen Dam, developmental use of the Nile in the other upper riparian countries has been limited. Irrigation was not a priority to these countries because they had low capital base and enjoyed relatively small population (Degefu, 2003). Uganda and Tanganyika estimated population in 1921 was 3.06 million and 4.11 million, respectively. In Kenya, the population in 1925 was 2.55 million.

Therefore, there was existence of high transaction costs among all the riparian states as evidenced by lack of a multilateral agreement over the use of the Nile waters. The factors that explain these costs include lack of priority to irrigate the Nile by some of upper riparian states, Egypt's strategic behaviour, and political and economic instabilities of some of the states. Based on the level of irrigation investment, Egypt was and remains an efficient user of the Nile. Granted that Egypt was an efficient user of the Nile waters and the existence of transaction costs, assigning water rights to Egypt was efficient.

3.3 Property Rule

Property rule strictly empowers the holders of property rights to enjoin others from infringing with those rights without their consent. If transaction costs are high, property rule may be inefficient because it may prevent an efficient transaction. Consequently, property rule may lead to inefficient outcomes.

The protection of the established property rights as stipulated in the Nile Agreement can be categorized into two forms (Hosni, 1957). First, the property rights over the existing usage of the Nile, which were to be protected by property rule. Clause 4(b) of Egypt's note explicitly states that "no irrigation or power works or measures are to be constructed or taken on the River and its branches, or on the lakes from which it

flows, so far as all these are in the Sudan or in countries under British administration, which would, in such a manner as to entail any prejudice to the interests of Egypt, either reduce the quantity of water arriving in Egypt or modify the date of its arrival, or lower its level". The reference of countries under British administration included Uganda, Tanganyika and Kenya in addition to Sudan. The interpretation of the provision was that no control works would be undertaken in British territories, including Sudan, without Egyptian consent.

The second form of property rights entailed unassigned property rights. As stated in clause 4(d) of the Egyptian note, this form covered works intended to appropriate new amounts hitherto not used by a riparian state, such as the construction of Gebel Aulia and Sennar dam (Hosni, 1957). The clause specifically stipulated that works to be undertaken in Sudan for the benefit of Egypt shall be administratively controlled by the Egyptian government after consultation with the local authorities. In this case, a liability rule is applied to protect the unassigned property rights.

3.3.1 Economic model

Consider a simple economic model based on the cost/benefits of water usage in the Nile Basin. The benefits from the Nile, for instance, would be increased agricultural production through irrigation, or generation of hydroelectric power from dam construction. Although the utilization costs of the Nile are broad, this study focuses narrowly on the negative externalities. These externalities are associated with the restricted water rights of the upper riparian countries as stipulated by the Nile Agreement.

Formally, $B(x)$ represents the social benefit function of the Nile basin, where x is quantity of water. Assume that the benefit function increases in x at decreasing rate, reflecting a positive but diminishing marginal benefit of x. $C(x)$ is the social cost function and its marginal cost with respect to x is positive and increasing. For example, the social cost would include the private cost of diversion facility, such as a dam, plus the foregone opportunities of the riparian countries to use the Nile waters. These opportunity costs are exemplified, for instance, by the agricultural production foregone by upper riparian countries for their failure to utilize the Nile waters.

Let the social objective of the Nile basin be to maximize the net benefits, $B(x)$-$SC(x)$ using quantity of water, x as choice variable. The solution to the social problem is socially efficient because it indicates the optimal quantity of water, whereby additional benefit of one unit of water equals one unit additional cost. In other words, marginal social benefits equal to marginal social costs.

Figure 3.1 is a graphical representation based on demand and supply curves. The vertical axis shows the value per unit quantity of water. The horizontal axis represents the quantity of water. As Figure 3.1 indicates, social marginal benefits, $SB'(x)$ is downward sloping curve, which suggests the additional benefit increase at decreasing rate as the quantity of water increases. The social marginal cost, $SC'(x)$, on the other hand, is upward sloping curve because each additional unit of water will cost more. The equilibrium condition occurs when the social marginal benefit is equal to social marginal cost. Thus x^* as shown in Figure 3.1 is the optimal quantity of water.

3.3.2 Egypt's problem

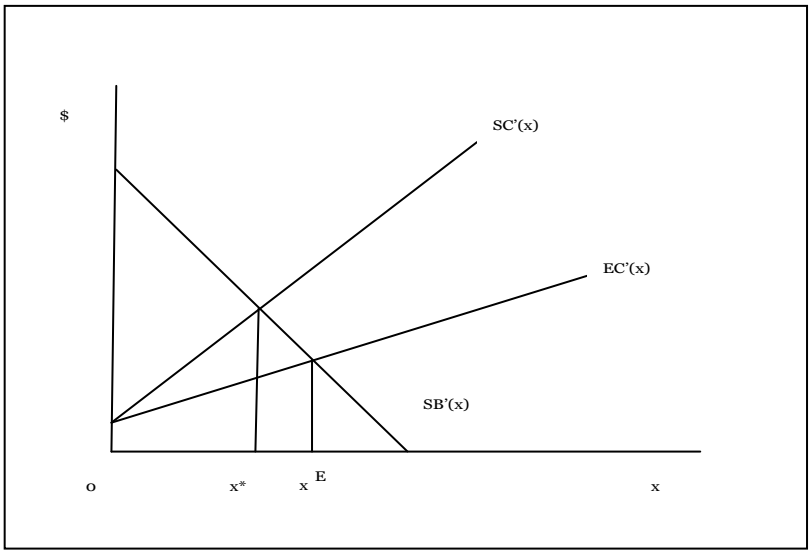
The Nile Agreement grants Egypt monopolistic usage of the Nile waters. Thus, by implication, Egypt's private benefits $EB(x)$ would more likely equal the social benefits of the basin, $SB(x)$. Let $EC(x)$ represent Egypt's private cost of construction of a dam. By assumption, $EC(x)$ is less than $SC(x)$ because the Nile Agreement imposes no obligation to Egypt for its uses of the Nile waters. If Egypt is a rational maximizer, it will draw quantity of Nile waters that would give her the highest benefits given her private cost (Waterbury, 1997). As shown in Figure 3.1, Egypt maximizing quantity of water is at x^E, where its marginal benefit equals private marginal cost. Comparatively, $x^E > x^*$ thus x^E is inefficient. This means that Egypt would divert more water than the socially optimal level, x^*, because she does not bear the burden of the externality cost.

The conjecture that Egypt would not internalize the cost of the externality invites explanation. As previously interpreted, the Nile Agreement acknowledges Egypt's right to utilize the Nile and applied property rule to protect this right. Thus, under the agreement, Egypt proclaimed exclusive proprietary right to the Nile waters without obligation to other riparian countries. It also prevented voluntary transfers of property rights from Egypt to other riparian states.

Egypt has also used and continues to use threat of force to bind and enforce the Nile Agreement among the riparian countries (Starr, 1991). To Egypt's advantage, economic and political instabilities in upper riparian countries, including Sudan, have prevented these countries from taking a unilateral decision to use the Nile waters (Waterbury, 1997).

Lastly, Egypt may have engaged in strategic excessive use of the Nile to reinforce and increase its existing share incase a multilateral treaty materializes in the future (Sharplan, 1997).

Figure 3.1: Economic model of water usage in the Nile Basin



4. Anecdotal Evidence

The above model predicts that Egypt's utilization of the Nile will likely exceed the social optimal level because it does not internalize the external cost it imposes on other riparian countries. To support this assertion, this section provides anecdotal evidence to demonstrate that Egypt has engaged in some development projects in the past, such as land reclamation programmes, which were not economically feasible.

4.1 Egypt's Land Reclamation

Since 1953, Egypt has significantly invested on land reclamation to expand cultivated land. The reclamation entailed new land, mostly sandy soils along the desert fringes of the delta. By 1975, a total of 948,480 acres of cultivable land had been reclaimed, which was a 15 per cent increase (Pacific Consultants, 1980). The United States Agency for International Development financed a study to evaluate the land reclamation programmes. Using the current prices, the report showed that programmes were financially feasible. However, the report pointed out that financial profitability is not a good measure because it was calculated on the basis of highly subsidized prices of water. For instance, the Government value of water was 0.005 Egyptian Pound per cubic meter, while economic real cost of water was valued at 0.02 Egyptian Pounds per cubic meter. Incorporating the opportunity costs of water in the calculus, the report found a negative Internal Rate of Return (IRR). In other words, the report found that the net benefits plus the salvage value were less than the total investment cost. This important finding implies that the programmes were not economically feasible.

4.2 Aswan Dam

The Aswan High Dam has been hailed as the cornerstone of Egypt's economic and social development (Abu-Zeid and El-Shibini, 1997). It has nevertheless been a subject of long-running controversies because of its internal and external spillovers. One of the external spillovers that have potential implication on the future negotiation on the Nile waters' allocation is the loss of water through evaporation from Lake Nasser. Since the lake is located in the Sahara Desert, it has one of the highest evaporation rates in the world (Sharpland, 1997). The evaporation losses are estimated to 10 billion cubic meters (Abu-Zeid and El-

Shibini, 1997). This does not benefit any basin states, including Egypt. However, evaporation could have been minimized by providing storage in a cooler and more humid location.

4.3 Water Diversion

At a cost of US$ 2 billions, Egypt has unilaterally undertaken massive water projects to irrigate part of Egypt's desolate Western Desert (Gladman, 1997). The projects include a water pumping station with capacity of pumping 6 billion gallons of Nile waters per day. It pumps up the water 55 meters from Lake Nasser to El Salam Canal, which will divert water from its natural course into the Sinai Desert (Yehenew, xxx). Besides diverting water from the Nile, the 150 miles open canal suffers enormous evaporation losses (Gladman, 1997), which further complicates the calculus of future water allocation.

Failure of Egypt to seek alternative supply of water is suggestive that it has over-relied on the Nile waters. Egypt's agriculture sector consumes most of the Nile waters, but contributes the least to Gross Domestic Product (GDP) in comparison with its industrial sector. For instance, in 2001, the agricultural sector used 83 per cent of Nile water and its GDP share was only 16.5 per cent, while the industrial sector consumed 10 per cent and its GDP share was 33.3 per cent (Malashkhia, 2003).

Studies reveal that the basin countries have overlapping interests, for example in water conservation. Egypt's Lake Nasser has one of the highest rates of evaporation loss of any reservoir in the world. Evidence shows that moving water storage into equatorial countries such as Uganda would reduce the loss from 12 per cent to 3 per cent (Brunnee and Toope, 2002).

5. Draft Agreement on the Nile River Basin Cooperative Framework

Without an agreeable water allocation mechanism, and with realization that the status quo on the Nile water usage was unsustainable, the ten riparian states established the Nile Basin Initiative in February 1999 (Brunnee and Toope, 2002). The ten riparian countries agreed on a shared vision "to achieve sustainable socio-economic development through equitable utilization of and benefit from the common Nile Basin water resources" (Nile Basin, http://www.nilebasin.org). Recently, the Nile Basin Council of Ministers responsible for water affairs concluded its negotiations on the Nile River Basin Cooperative Framework Agreement. The agreement must be adopted by all basin states and ratified before it becomes a treaty. The agreement *inter alia* calls for the establishment of a permanent Nile River Basin Commission to facilitate cooperative management and development of the Nile.

The draft stipulates two substantive rules on water allocation, which are borrowed from the Convention on Law of Non-navigational uses of International Waters. First, the "equitable and reasonable use" rule grants each of the Nile Basin states property right to use Nile waters in an equitable and reasonable manner within their respective jurisdiction. Second, the 'no harm rule' obligates the Nile Basin states to utilize the Nile water within their respective territories without causing significant harm to other basin states.

The Nile River Cooperative framework was signed by Ethiopia, Rwanda, Tanzania and Uganda on 14th May 2010 and later by Kenya on 19th May 2010. The agreement was left open for a year to allow the remaining countries to sign. However, Egypt and Sudan are reluctant to consent to the agreement. The two countries' main concern is in Article 14 of the agreement on water security. The article reads, "Nile Basin States therefore agree, in a spirit of cooperation: (a) to work together to ensure that all states achieve and sustain water security; (b) not to significantly affect the water security of any other Nile Basin State." Egypt and Sudan are proposing Article 14(b) to read, "not to adversely affect the water security and current uses and rights of any other Nile Basin State". The insertion of the five words would water down the main motivation of the agreement as stipulated in Article 4 on "equitable and reasonable utilization" of the Nile waters. The other countries rejected this proposal. Egypt and Sudan fear that the coming into force of this agreement will drastically reduce their water supply

as upstream countries undertake projects on the Nile. Article 4(2)(d) of the Cooperative Framework bids the Nile Basin states to take into consideration the effects of the use or uses of the water resources in one Basin State on other Basin States. The two countries, if they sign the agreement, can use this sub-section to argue their case. However, refusal to sign would work against the two as the states party to the agreement will not be bound to take into consideration the effect of their planned use on the two downstream countries.

Egypt has stated severally in the past that most upstream riparian countries have other sources of water, and most have adequate rain and should therefore make optimal use of these sources. Egypt is mainly a desert country with minimal, if any, rainfall and thus depends on the Nile to feed its agriculture and industrial sectors. Article 4(2)(g) of the agreement states that the Basin States shall take into account the availability of alternatives, of comparable value, to a particular planned or existing use. If Egypt became a signatory to the agreement, then it will be in a better position to ensure other riparian countries do not undertake projects that could as well be fed by other sources of water, unlike when it is not a signatory.

Another probable reason why the two downstream countries have refused to sign the agreement is probably because Egypt has previously gotten support from the international community in enforcing the 1929 agreement. A good example is when the World Bank and Africa Development Bank refused to finance water projects on the Nile in Ethiopia (Walilegne, 2004), since Egypt had not endorsed the projects. Egypt has actually threatened to lobby the international community to reject the new agreement.

Sudan is bound by the 1929 agreement through the 1959 Agreement with Egypt. Thus, it is no wonder that Khartoum has rejected the new agreement. However, there is a likelihood that this position may change with Southern Sudan getting independence.

6. Conclusion

The Coasian analysis of the two substantive rules of the Nile Agreement yields a mixed bag. On one hand, the paper demonstrates that the Established Right Rule that granted Egypt the property right over the Nile waters based on prior use may have been efficient for two reasons. First, the historical anecdotal evidence indicates existence of high transaction costs that would make it difficult to define water rights of the Nile Basin states. Second, based on irrigation level investment, Egypt was the most efficient user of the Nile waters.

On the other hand, economic analysis of protecting Egypt's established property rights with property rule lenders the Nile Agreement inefficient. The use of property rule under the condition of high transaction costs empowers Egypt to monopolize the utilization of the Nile. Moreover, the Nile Agreement does not obligate Egypt to internalize the externality associated with its utilization of the Nile waters. Under these circumstances, the model predicts that Egypt would likely over-utilize the Nile waters. The anecdotal evidence based on Egypt's land reclamation, water evaporation loss in Aswan Dam, and water diversion supports the model.

The White Nile emanates from Lake Victoria, whose surface is maintained by a third of Kenya's rivers. The rivers include Soi, Nzoia, Yala, Sondu Miriu, Mogusi and Migori. During long rains, most of these rivers burst their banks, causing floods that have over the years displaced thousands of people and killed others. The most notorious are river Nzoia, Yala and Nyando. In order to contain the situation, the Government of Kenya has constructed dykes along the rivers, some dating back as early as the 1970s. The 1929 Nile Agreement prohibits any works on the Nile and its source without approval from Egypt. Kenya has signed the Cooperative Framework Agreement that seeks to change this. After the new agreement comes into force, the Government of Kenya should construct dams along these rivers to avert flooding, for irrigation, and for generation of hydro electric power.

Egypt and Sudan have so far refused to sign the new agreement. The two are key players in the basin and thus for the new agreement to be more effective and at the same time avert a crisis, there is need for all riparian countries to consult as widely as possible with the aim of bringing the two countries on board. This will give the new agreement more credibility and at the same time get international support, which

is key for obtaining development funding for future projects to be undertaken on the basin.

References

Abu-Zeid, A. and El-Shibini, F. (1997). "Egypt's High Aswan Dam". *International Journal of Water Resources Development*, 209-217.

Brunnee, Jutta and Toope, Stephen J. (2002), "The changing Nile Basin regime: Does law matter". *Harvard International Journal*, 118.

Calabresi, Guido and Melamed, Douglas (1972), "Property rules, liability rules and inalienability: One view of the cathedral". *Harvard Law Review*, 1089.

Caponera, Dante A. (1993), "Legal aspects of transboundary river basin in the Middle East: The Al Asi (Orontes), The Jordan and The Nile", *Natural Resources Journal*, 629, 657-59.

Carrol, Christina M. (2000), "Past and future legal framework of the Nile River Basin", *International Geographic Environmental Law Review*, 269.

Chesworth, P. M. (1994), "The history of water use in the Sudan and Egypt", in Howell, P. P. and Allan, J. A. (eds), *The Nile, sharing a scarce resource: An historical and technical review of water management and economical land legal issues*. Cambridge University Press.

Coase, Ronald (1960), "The problem of social cost", *Journal of Law and Economics,* 1.

Coleman, Jules (1980), "Efficiency, auction and exchange: Philosophic of the economic approach to law". *California Law Review*, 221.

Coleman, Jules (1984), "Economics and the law: A critical review of the foundations of the economic approach to law". *Ethics,* 658.

Coleman, Jules (1988), *Markets, morals and the law*. Cambridge University Press.

Cooter, Robert and Ulen, Thomas (2004), *Law and economics*. Pearson Addison Wesley.

Degefu, Gebre Tsadik (2003), *The Nile historical, legal and developmental perspectives: A warning for the twenty-first century*. Trafford Publishing

Dunoff, Jeffrey L. and Trachtman, Joel P. (1999), "Economic analysis of international law". *Yale Journal of International Law*, 20.

EL-Fade, M. (2003), "The Nile River Basin: A case study in surface water conflict resolution, *Journal of Natural Resources. Life Sciences Education*, 107.

Gladman, Aaron (1997), "Massive Nile River diversions planned", *World Rivers Review*, 12, June.

Godana, Bonaya Adhi (1985), *Africa's shared water resources: Legal and institutional aspects of Nile, Niger and Senegal River systems*. Lynne Rienner Publishers.

Hoskins, Halford L. (1943), "The Suez Canal as international waterway". *The American Journal of International Law*, 373.

Hosni, Sayed Mohamed (1957), Legal problems of the development of the River Nile. Unpublished PhD dissertation. New York University.

Hurst, H.E. (1952), *The Nile: A general account of the river and the utilization of its waters*. Constable and Company Ltd.

Knoblesdorf, Valerie (year), "Nile Waters Agreements". *Columbia Journal of Transnational Law*, 2005-2006.

Malashkhia, Nilo (2003), Social and environmental constraints to the irrigation water conservation measures in Egypt. Masters Thesis, University of Sweden.

Miceli, Thomas (1997), *Economics of the law*. Oxford University Press.

Miceli, Thomas (2004), *The economic approach to law*. Stanford University Press.

Milliman, J. W. (1959), "Water law and private decision-making: A critique", *Journal of Law and Economics*, 41.

Okidi, C. O. (1982), "Review of treaties on consumptive utilization of waters of Lake Victoria and Nile drainage system", *Natural Resources Journal*, 161.

Okidi, C. O. (1980), "Legal and policy regime of Lake Victoria and Nile basins". *The Indian Journal of International Law*, 420.

Okoth-Owiro (2004), *The Nile Treaty: State succession and*

international treaty commitments: A case study of the Nile water treaties. Konrad Adenauer Foundation.

Pacific Consultants (1980), New lands productivity in Egypt: Technical and Economic, 6

Posner, Richard A. (1972), *Economic analysis of law*. Little Brown and Company 1977.

Shapland, Greg (1997), Rivers of discord: International water disputes in the Middle East. St Martin Press.

Starr, Joyce R. (1991), "Water Wars". *Foreign Policy*, 17, 21-24.

Walilegne, Yehenew Tsegaye (2004), "The Nile Basin: From confrontation to cooperation". *Dalhousie Law Journal,* 513.

Waterbury, John (19970, "Is the status quo in the Nile Basin viable?". *Brown Journal of World Affairs*, 293.

Willcocks, W. and J. Craig (1913), Egyptian Irrigation, Vol. II, St Plates.