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October 25, 2007

THE 1929 NILE WATERS AGREEMENT: LEGAL AND ECONOMIC ANALYSIS

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1 INTRODUCTION

Notwithstanding an extraordinary natural endowment and rich cultural history, the Nile basin faces considerable challenges. These challenges include water scarcity, poverty, environmental degradation and insecurity. The population in the basin is expected to double in the next 25 years, further constraining water scarcity and other resources. The basin's recurrent droughts and desertification have escalated water scarcity increasing possibilities of a conflict. The governing legal framework¹ on the utilization of Nile waters cannot adequately address these challenges, which could potentially lead to a conflict² between upper and lower riparian countries. Egypt's military dominance and its use of force threats had muted previous tensions over Nile waters. To put it succinctly, the current usage of Nile water is unsustainable largely to population growth and the quantity of Nile water that had 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 issue³. The agreement is problematic because it gave Egypt exclusive property rights⁴ over the Nile waters with no obligations to the other riparian countries except Sudan. Egypt claims sixty five percent per year of the total flow

¹ BONAYA ADHI GODANA, AFRICA'S SHARED WATER RESOURCES: LEGAL AND INSTITUTIONAL ASPECTS OF NILE, NIGER AND SENEGAL RIVER SYSTEMS, 169 (Lynne Rienner Publishers, 1985). GEBRE TSADIK DEGEFU, THE NILE HISTORICAL, LEGAL AND DEVELOPMENTAL PERSPECTIVES: A WARNING FOR THE TWENTY-FIRST CENTURY (Trafford Publishing 2003). C.O. Okidi, *Review of Treaties on Consumptive Utilization of Waters of Lake Victoria and Nile Drainage System*, 22 NAT. RESOURCES J. 161 166-98 (1982). Dante A Caponera, *Legal Aspects of Transboundary River Basin in the Middle East: The Al Asi (Orontes), The Jordan and The Nile*, 33 NAT. RESOURCES J. 629, 657-59 (1993).

² Christina M. Carroll, *Past and Future Legal Framework of the Nile River Basin*, 12 GEO. INT'L. ENVTL. L. REV. 269 (2000). Joy R. Starr, *Water Wars*, 82 FOREIGN POLICY 17 (Spring 1991). M EL-Fadel et al, *The Nile River Basin: A Case Study in Surface Water Conflict Resolution*, 32 JOURNAL OF NATURAL RESOUR. LIFE SCI. EDUC. 107 (2003).

³ 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 THE NILE AGREEMENT]

⁴ id

of Nile waters measured at Aswan Dam⁵. While the legality⁶ of the Nile Agreement remains unsettled, it has never been legally challenged. It is thus the legal basis of water allocation in the basin.

This article analyzes the allocative mechanism of the Nile Agreement from a legal and economic perspective. It makes two substantive arguments. First, the article claims that the established right principle of the Nile Agreement was efficient because it is consistent with the Coasian analysis and Posner's assignment principle⁷. The article conjectures that the existence of transaction costs that made it improbable to have a regional agreement prior to the conclusion of the Nile Agreement. Analyzing the level of pre-Nile Agreement irrigation investments, the article demonstrates that Egypt was the most efficient user of the Nile waters.

Second, the article claims that protecting Egypt's granted property rights with a *property rule*⁸ as stipulated in the Nile Agreement, may lead to an inefficient outcome. The *property rule* conferred monopolistic access to the Nile on Egypt without obligation to other riparian countries. The rule induced Egypt utilize inefficiently the Nile waters, generating externalities in the basin. Egypt easily enforced the rule because protracted

⁵ 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].

⁶ GODANA, *supra* note 1, at 170.

⁷ Ronald Coase, "The Problem of Social Cost" 3 JOURNAL OF LAW AND ECONOMICS 1 1960. JULES L. COLEMAN, MARKETS, MORALS AND THE LAW 69 (Cambridge University Press 1988).

⁸ Guido Calabresi and Douglas Melamed, *Property Rules, Liability Rules and Inalienability: One View of the Cathedral*, 85 HARVARD LAW REVIEW 1089, 1092-93 (1972) "An entitlement is protected by a property rule to the extent that someone who wishes to remove the entitlement from its holder must buy it from him in a voluntary transaction in which the value of the entitlement is agreed upon by the seller." THOMAS MICELI, ECONOMICS OF THE LAW 116 (Oxford University Press 1997). If A's property rights are protected by property rule another party can only acquire the entitlement by first acquiring A's consent.

political and economic instabilities in the basin preclude upper riparian countries from challenging the rule. Sudan was bound by the rule through an agreement with Egypt⁹.

The Nile Basin confronts legal and economic questions. The main legal issue is the Nile Agreement's failure to incorporate the interests of the upper riparian countries¹⁰. The legality of the Nile Agreement remains unsettled because the international law on the non-navigational uses of international watercourses like the Nile is unclear¹¹. Consequently, each riparian country has a different view of the agreement based on contrasting international legal theories. Egypt upholds that the Nile Agreement binds all riparian countries under the Vienna Convention on the Law of Treaties¹². Sudan is bound by the agreement through the 1959 Agreement with Egypt¹³.

The upper riparian countries contrary views on the validity of the Nile Agreement have attracted support from several publicists¹⁴. For British colonies like Kenya, Tanzania and Uganda, all declared the Nile Agreement non binding¹⁵ following their independence from UK. Other riparian countries like 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; how to allocate efficiently the Nile waters given increasing water scarcity. Two basic methods of allocating a scarce resource between competing users are

⁹ United Arab Republic and Sudan Agreement (with annexes) For the Full Utilization of the Nile Waters
¹⁰ Carrol, *supra* note 2, at 281.

¹¹ 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. See Carroll, *supra* note 2, at 287.

¹² GODANA, *supra* note 1 at 144

¹³ The 1959 Agreement, *supra* note 5.

¹⁴ Dr Okidi, Review of Treaties on Consumptive Utilization of Waters of Lake Victoria and Nile Drainage System, 22 NATURAL RESOURCES JOURNAL 161 1982. OKOTH-OWIRO, THE NILE TREATY: STATE SUCCESSION AND INTERNATIONAL TREATY COMMITMENTS: A CASE STUDY OF THE NILE WATER TREATIES, (Konrad Adenauer Foundation, 2004). Valerie Knoblesdorf, *Nile Waters Agreements*, 44 COLUM. J. TRANSNAT'L L. 647, 2005-2006). DEGEFU, *supra* note 1 at

¹⁵ GODANA, *supra* note 1, at 146.

centralized planning and market process¹⁶. Granted, the absence of these institutions in the basin the following questions must be addressed. First, how property rights over the Nile water be assigned and under what criteria¹⁷? Second, what legal rule should be applied to protect the assigned property rights?

Applying economic efficiency¹⁸ as basic criteria for allocating water rights, the Nile Agreement retrospectively answered the preceding questions. It granted Egypt the property rights based on prior use and applied property rule to protect those rights.

Emphasis on economic efficiency rather equity consideration is dictated by the nature of problem. The annual flow of Nile varies but it has diminished significantly over the last century¹⁹

The structure of the rest of the article is as follows. Section II focuses on the institutional background of the Nile Agreement. It briefly outlines the geography of the Nile Basin and explains the factors that led to the conclusion of the Nile Agreement including the considerations of Egypt and UK. In addition, the section explores the current legal status of the Agreement. Section III 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. It indicates the existence of high transaction costs among the riparian countries and demonstrates that Egypt had and still has a greater use

¹⁶ J W Milliman, *Water Law and Private Decision-Making: A Critique*, 2 JOURNAL OF LAW AND ECONOMICS 41 (1959).

¹⁷ Guido Calabresi and Douglas Melamed, *Property Rules, Liability Rules and Inalienability: Once View of the Cathedral*, 85 HARVARD LAW REVIEW 1089 1972.

¹⁸ RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 10 (Little Brown and Company 1977) (1972). THOMAS MICELI, *THE ECONOMIC APPROACH TO LAW* 4 (Stanford University Press 2004). JULES L. COLEMAN, *MARKETS, MORALS AND THE LAW* 67-132 (Cambridge University Press 1988). ROBERT COOTER AND THOMAS ULEN, *LAW AND ECONOMICS* 7 (Pearson Addison Wesley 2004).

¹⁹ Jutta Brunnee and Stephen J Toope, *The Changing Nile Basin Regime: Does Law Matter*, 43 HARV. INT'L L. J. 117 2002.

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 tradeoff between the cost and benefits of utilizing the Nile waters. The model predicts that the property rule without obligation would induce Egypt to use inefficiently the Nile waters. Section IV provides anecdotal evidence of Egypt's over-utilization of the Nile water. The evidence include land reclamation program, loss of water from Lake Nasser through evaporation and proposed projects for food security. Section V concludes.

2. BACKGROUND INFORMATION

The Nile River is one the Africa's greatest assets. Throughout history it has sustained livelihoods, an array of ecosystems and rich diversity of cultures. It drains a catchment area of 2.8 about million square kilometer, 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; Burudi, Congo, Kenya, Rwanda, Tanzania and Uganda. It stretches from Burudi and joins the Kagera River that flows into Lake Victoria. Lake Victoria is second largest freshwater lake in the world and rests on the crux between Uganda, Tanzania and Kenya with 40%, 50% and 10% respectively. In addition, Lake Victoria surface is maintained by a third of Kenya's rivers²⁰. 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% of the Nile River, water evaporation losses in the Sudan's Sudd notwithstanding²¹.

²⁰ C Okidi, *Legal and Policy Regime of Lake Victoria and Nile Basins*, 20 THE INDIAN JOURNAL OF INTERNATIONAL LAW 395 420 (1980).

²¹ GREG SHAPLAND, *RIVERS OF DISCORD: INTERNATIONAL WATER DISPUTES IN THE MIDDLE EAST*, 62 (St Martin Press, 1997). Carrol, *supra* note 2, at 273.

The Blue Nile drains the Ethiopian highlands carrying on average 59% of the Nile water. Unlike the White Nile, its flow fluctuates with seasons. It discharges 90% of the Nile water in the months of July-September compared to 20% in the dry other months²². Like the Blue Nile, Atbara rises from the Ethiopian plateau and drains parts of Eritrea before merging into 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 Suez Canal²³ and to address the shortage of cotton in the world market. In the early 1900s, the UK government began to promote cotton cultivation in Egypt and Sudan, then under UK-Egyptian condominium rule. Since cotton could only be cultivated in the summer, a shift from the traditional seasonal flood-fed method to perennial irrigation became necessary. This shift precipitated an intensive period of Nile River development that generated intense debate over the interests of upper and lower riparian countries.

Subsequently, the UK 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

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

²² GODANA, *supra* note 1, at 81.

²³ Halford L Hoskins, The Suez Canal as International Waterway, 37 THE AMERICAN JOURNAL OF INT'L. L. 373 (July 1943).

The two countries' desire to engage in a comprehensive large scale control works on the Nile mainly precipitated the signing of the agreement²⁴. These proposed works included among others, 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 UK's assistance completed the Sennar dam, which led to a diplomatic fallout between Egypt and Britain²⁵. 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 Agreement²⁶.

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 UK's protectorate²⁷. Second, Egypt agreed to a limited increase of Sudan's water apportionment and accepted the report of the 1925 Nile Commission as an 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 Nile in Sudan's territory subject to consultation with Sudanese local government.

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

²⁴ GODANA, *supra* note 1, at 108.

²⁵ Sayed Mohamed Hosni, *Legal Problems of the Development of the River Nile 114 (1957)* (unpublished Ph.D. Dissertation, New York University) (on the file with Columbia Law School Library).

²⁶ *Id.*, at 115.

²⁷ THE NILE AGREEMENT, *supra* note 3.

For seventy five years, the Nile Agreement has never been invoked or applied in any former British territories after their independence²⁸. Though 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 the Britain Joint Under-Secretary of State for Foreign Affairs statement on the Nile waters²⁹.

Following its independence, Sudan repudiated the Nile Agreement based on the doctrine of *rebus sic stantibus*³⁰. This doctrine allows a party to rescind a treaty if there is a material change of circumstances that transform the rights and obligation 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 Agreement³¹ with Egypt.

Upon its independence, Tanzania formally invoked the Nyerere Doctrine³². In a formal declaration to the Secretary-General of the United Nations, the Tanzanian government accepted with stipulations all bilateral treaties, which were signed by 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 consent³³. Tanzania also issued identical notes to Britain, Egypt and Sudan outlining her policy on the utilization of the Nile waters. Tanzania's government asserted that the Nile Agreement

²⁸ C Okidi, *supra* note 20, at 420.

²⁹ Statement of the Joint Under-Secretary for Foreign Affairs, May 18, 1956, 552 HOUSE OF COMMONS DEBATES (5th ser.) 2411.

³⁰ GODANA *supra* note 1, at 142.

³¹ The 1959 Agreement, *supra* note 5.

³² *Problems of State Succession in Africa: Statement of the Prime Minister of Tanganyika* 11 THE INTERNATIONAL AND COMPARATIVE LAW QUARTERLY 1210 (1962).

³³ OKOTH-OWIRO *supra* note 14, at 14.

was not binding but agreed to negotiate with all riparian states to formulate a new framework based on just and equitable principles³⁴.

Following their independence, Uganda and Kenya, respectively, adopted the Tanzanian approach³⁵ but they did not specifically challenge the devolution of the Nile Agreement. Instead they agreed to uphold on reciprocity basis, all bilateral treaties that were concluded by the United Kingdom on their behalf for two years³⁶. If such treaties were not renegotiated or modified, within the two years, then they became invalid subject to the rules of customary international law³⁷. More recently, however, Kenya government officials have demanded a revision of the Nile Agreement.

Following the historical overview of Nile Agreement, part III provides legal and economic analysis of the two substantive rules of the agreement.

3. ANALYSIS

3.1. Legal principles

The Nile Agreement stipulates the principle of established rights³⁸, which are agreements referred to as “natural and historical rights”³⁹. Both governments agreed upon Egypt’s established rights on the Nile as legal principle⁴⁰. 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 Egypt⁴¹. Specifically, the note assured the Egyptian Prime Minister that UK, “however solicitous for the prosperity of the Sudan, had no intention of trespassing upon the natural and

³⁴ *Id.* at 14.

³⁵ GODANA *supra* note 1, at 150.

³⁶ *Id.* at 151.

³⁷ *Id.* at 150.

³⁸ Hosni, *supra* note 22, at 118.

³⁹ *Id.* at 119-124. See THE NILE AGREEMENT, *supra* note 3.

⁴⁰ THE NILE AGREEMENT, *supra* note 3.

⁴¹ *Id.*

historic rights of Egypt in the waters of the Nile, which they recognise to-day 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"⁴². 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"⁴³. Furthermore the UK considered the protection of those Egyptian water rights as fundamental principle of its policy⁴⁴ toward 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"⁴⁵. Egypt also requested that the UK should withdraw its instructions that had given Sudan unlimited land for irrigation in Gezira.⁴⁶ In the 1929 Egyptian note to the UK, Egypt reiterated its position to allow 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"⁴⁷.

The two governments collaboratively appointed the 1925 Nile Commission⁴⁸ "with the purpose of examining and proposing the basis on which irrigation can be

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.*

carried out with full consideration of the interests of Egypt and without detriment to her natural and historic rights”⁴⁹.

Other relevant secondary sources that recognized Egypt’s established rights included some of the earlier bilateral agreements between United Kingdom and other European powers. The common objective of these agreements was primarily to protect Egypt’s interest⁵⁰. First, in an Exchange Note between Great Britain and Ethiopia, His Majesty the Emperor Menelek 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”⁵¹. 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 dam⁵².

3.2. Established rights principle

The established right principle is efficient because it is consistent with Posner’s assignment principle⁵³. In cases where transaction costs impede the internalization of externalities through private exchange, Posner offers an assignment principle, according to which, legal rule should be designed to confer property rights to the efficient user⁵⁴. To demonstrate efficacy of the established rights principle, this subsection discusses two important aspects. First, it demonstrates and asserts that the existence of high transaction costs prior to the Nile Agreement would have prevented a multilateral agreement in the

⁴⁹ *Id.*

⁵⁰ GODANA, *supra* note 1, at 103.

⁵¹ DEGEFU, note 1, at 235.

⁵² 1959 Agreement, *supra* note 5.

⁵³ POSNER, *supra* note 18, at 10. Jules Coleman, *Economic and the Law: A Critical Review of the Foundations of the Economic Approach to Law*, 94 ETHICS 658 1984.

⁵⁴ Jules Coleman, *Efficiency, Auction and exchange : Philosophic of the Economic Approach to Law*, CALIFORNIA LAW REVIEW, 221 1980. COLEMAN, *supra* note 7, at 84.

basin. Second, the sub-section shows that Egypt was the most efficient user of the Nile waters based on level of irrigation investment.

3.2.1 Existence of transaction costs

The search for cooperation over the 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. The following explanations support this conjecture.

First, when the Nile Agreement was being negotiated, most of the riparian, except Egypt countries were non-sovereign. 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 on a small scale if 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. Second, most of the upper riparian countries had faced protracted economic and political instability that compelled their government to concentrate on daily survival rather than on planning for development of their water resources⁵⁵. These countries lack an adequately trained cadre of experts in hydrology and related disciplines to match Egypt's superior expertise and knowledge.

Third, over the years, Egypt has used its military dominance and international clout to frustrate the upper riparian countries' effort to use the Nile waters. For instance,

⁵⁵ SHAPLAND, *supra* note 21, at 75.

Egypt has in the past used her international clout to influence international institutions from financing water development plans in Ethiopia⁵⁶. Egypt has also provided logistical support to insurrectionist groups, which have worked toward destabilizing Ethiopia⁵⁷.

3.2.2 Value of Nile

Using the development of irrigation systems as a proxy measure of the value of the Nile, this sub-section demonstrates that Egypt valued the Nile more than her counterparts. Beginning in the 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 7000 years⁵⁸. With the advent of British control, Egypt embarked on intensive developments of the Nile to improve its irrigation system. It constructed a few barrages⁵⁹ notably Assiut Barrage, which was constructed in 1902 at a cost of 870,000 Egyptian pounds⁶⁰. In 1903 Zifta Barrage⁶¹ was constructed at cost of 265,650 Egyptian pounds. At a cost of 945,000 Egyptian pounds, Egypt completed Esna Barrage in 1908⁶². Earlier, from 1898 to 1902, Egypt constructed the Aswan dam. With a 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 summer⁶³. The construction cost was 4,220,000 Egyptian pounds⁶⁴ with an additional 136,929 Egyptian pounds 10 years later to raise the dam⁶⁵.

⁵⁶ Yehenew Tsegaye Walilegne, *The Nile Basin: From Confrontation to Cooperation*, 27 *DALHOUSIE LAW JOURNAL* 503 513 2004. DEGEFU, *supra* note 1, at 150.

⁵⁷ *Id.* at 513.

⁵⁸ SHAPLAND, *supra* note 21, at 60.

⁵⁹ *Id.* at 62.

⁶⁰ W WILLCOCKS & J CRAIG, *EGYPTIAN IRRIGATION, VOLUME II* 659 (St Plates and ISS Illustrations, 1913)

⁶¹ *Id.* 667.

⁶² *Id.* 672.

⁶³ Honsi, *supra* note 25, at 41.

⁶⁴ WILLCOCKS, *supra* note 60, at 745.

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 acres⁶⁶ of cultivable land with a population of 14.22 millions⁶⁷. Today Nile is essentially sustained Egypt's sixty-eight million population whose ninety-five percent resides in the Nile valley⁶⁸

At the dawn of the 20th century, irrigation in Sudan was in its embryonic stage as noted in the 1925 Commission Report⁶⁹. 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 Pounds⁷⁰. It catered for 311,400 acres of cultivable land. Egypt had granted Sudan pumping rights for small scale irrigation that covered 22,836 acres⁷¹. In addition Sudan had 83,040 acres of land on basin irrigation.

With the exception of the 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 a low capital base and enjoyed relatively small populations⁷². Uganda and Tanganyika had estimated populations in 1921 of 3.06 million and 4.11 million respectively⁷³. The estimated population of Kenya in 1925 was 2.55 million⁷⁴.

⁶⁵ *Id.*

⁶⁶ P M Chesworth, *The History of Water Use in the Sudan and Egypt*, in *THE NILE, SHARING A SCARCE RESOURCE: AN HISTORICAL AND TECHNICAL REVIEW OF WATER MANAGEMENT AND ECONOMICAL AND LEGAL ISSUES* 71 (P. P. Howell and J. A. Allan ed., Cambridge University Press 1994).

⁶⁷ H E HURST, *THE NILE: A GENERAL ACCOUNT OF THE RIVER AND THE UTILIZATION OF ITS WATERS* 289 (Constable and Company Ltd 1952)

⁶⁸ Jutta Brunnee and Stephen J Toppe, *The Changing Nile Basin Regime: Does Law Matter*, 43 *HARV. INT'L L. J.* 118 2002.

⁶⁹ *THE NILE AGREEMENT*, *supra* note 3.

⁷⁰ Hosni, *supra* note 25, at 43.

⁷¹ *THE NILE AGREEMENT*, *supra* note 3.

⁷² SHAPLAND, *supra* note 21, at 75.

⁷³ *EAST AFRICA ROYAL COMMISSION 1953-1955 REPORT* [hereinafter *Royal Commission*] 467-470 (Her Majesty's Stationery Office 1955)

⁷⁴ *Id.* at 464.

In summary, this sub-section infers the 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. Factors that explain these costs include lack of priority to irrigate the Nile by some of upper riparian states, Egypt's strategic behavior, and political and economic instabilities of some of the states. Based on the level of irrigation investment, Egypt was and remains the most efficient user of the Nile. Granted that Egypt was an efficient user of Nile waters and the existence of transaction costs then by assigning water rights to Egypt was efficient. I now turn to the analysis of the *property rule*.

3.3 Property Rule

The *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, the property rule may be inefficient because it may prevent an efficient transaction. Consequently, the 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 forms⁷⁵. First, the property rights over the existed usage of Nile, which were to be protected by *property rule*⁷⁶. Clause 4(b) of the Nile Agreement 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”⁷⁷. The reference of countries under British Administration included Uganda, Tanganyika

⁷⁵ Hosni, *supra* note 25, at 134.

⁷⁶ *Id.*,

⁷⁷ *Id.*

and Kenya in addition to the Sudan. The interpretation⁷⁸ 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 Nile Agreement, this form covered future allocation of Nile waters of new works like the construction of Gebel Aulia and Sennar dam⁷⁹. 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 authorities⁸⁰. In this case a *liability rule*⁸¹ is applied to protect the unassigned property rights. The following sub-section focuses on former rule because the unassigned property rights were later assigned to Egypt and Sudan under the 1959 Agreement.

3.3.1 Economic Model

Consider a simple economic model based on the cost/benefits of water usage in the Nile Basin. The benefits of the Nile for instance would be like increased agricultural production through irrigation or the generation of hydroelectric power from dam construction. Although the utilization costs of the Nile are broad, this paper 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 the quantity of water. Assume that the benefit function increases in x at a decreasing rate, reflecting a positive but diminishing marginal benefit of x . $C(x)$ is the social cost function

⁷⁸ GODANA, *supra* note 1, at 117. Hosni, *supra* note 25, at 131.

⁷⁹ Hosni, *supra* note 25, at 133.

⁸⁰ *Id.*

⁸¹ *Id.*

and its marginal cost with respect to x is positive and increasing. For an example, the social cost would include the private cost of a diversion facility like 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 forgone 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 the 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 equal one unit additional cost. In other words marginal social benefits equal to marginal social costs.

Figure 1 presents 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 1 indicates, social marginal benefits, $SB'(x)$ is downward sloping curve, which suggest that 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 benefits is equal to the social marginal cost. Thus x^* as shown in figure 1 is the optimal quantity of water.

3.3.2 Egypt's problem

The Nile agreement grants Egypt monopolistic usage of the Nile water. Thus, by implication Egypt's private benefits $EB(x)$ would more likely equal to 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 maximizer⁸², it will draw a quantity of Nile waters that would give her the highest benefits given her private cost. As shown in *figure 1*, Egypt maximizing quantity of water is at x^E , where its marginal benefit equal private marginal cost. Comparatively, $x^E > x^*$ thus x^E is inefficient. This means that Egypt would divert more water than 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. First, as previously interpreted on paper, the Nile Agreement acknowledges Egypt's right to utilize the Nile and applied a property rule to protect this right. Thus under the agreement Egypt proclaimed exclusive proprietary right to Nile water without obligation to other riparian countries. It also, prevented voluntary transfers of property rights from Egypt to other riparian states.

Second, Egypt has used and continues to use threat of force to bind and enforce the Nile Agreement among the riparian countries⁸³. Also, 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 waters⁸⁴.

Third, Egypt may have engaged in strategic to excessively use the Nile to reinforce and increase their existing share incase a multilateral treaty might materialize in the future⁸⁵.

4. ANECDOTAL EVIDENCE

⁸² Jeffrey L Dunoff and Joel P Trachtman, *Economic Analysis of International Law*, 24 YALE JOURNAL OF INTERNATIONAL LAW 20 (1999)

⁸³ Starr, *supra* note 2, at 21-24. DEGEFU, *supra* note 1, at 148.

⁸⁴ John Waterbury, *Is the Status Quo in the Nile Basin Viable?* 4 BROWN JOURNAL OF WORLD AFFAIRS 287, 293 (1997).

⁸⁵ SHAPLAND, *supra* note 21, at 64.

The above model predict that Egypt's utilization of THE Nile will likely exceed the social optimal level because it does 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 project in the past, like land reclamation programme, 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 fifteen percent increase⁸⁶. The United States Agency for International Development financed a study to evaluate the land reclamation programs⁸⁷. Using the current prices, the report showed that the programs were financially feasible. However, the report pointed out that financial profitable is not a good measure because it was calculated on the basis of a highly subsidized prices of water. For instance, Government of value of was 0.005 Egyptian Pound per cubic while the real economic cost of water was valued at 0.02 Egyptian Pounds per cubic meters. 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.

⁸⁶ PACIFIC CONSULTANTS, NEW LANDS PRODUCTIVITY IN EGYPT: TECHNICAL AND ECONOMIC, 6 (Pacific consultants, 1980)

⁸⁷ Id. at page 8. "... to determine whether or not there are technically and economically feasible production options and organizational options for carrying out land reclamation in Egypt looking especially for ways to bring previously-reclaimed land up to economically productive level, and to compare the benefits of such options with those of possible agricultural investments in the Old Lands."

4.2 Aswan Dam

The High Dam has been hailed as the cornerstone of Egypt's economic and social development⁸⁸. It has nevertheless, been the subject of long-running controversies because of its internal and external spillovers. One of the external spillovers that have potential implications for the future negotiation on the Nile waters allocation is the loss of water to evaporation from Lake Nasser. Since the lake is located in the Sahara Desert, it has one of the highest evaporating rates in the world⁸⁹. The evaporation losses are estimated to 10 billion cubic meters per year⁹⁰. These evaporating losses benefit no basin states including Egypt, however they could be minimized by providing storage in a cooler and more humid location.

4.3 Water Diversion

At a cost of \$2 billions, Egypt has unilaterally undertaken a massive water projects to irrigate over part of Egypt's desolate Western Desert⁹¹. The projects included a water pumping station with capacity of pumping six billions gallon of Nile waters per day. The pump will lift water 55 meters high from Lake Nasser to El Salam Canal that will divert the water to its natural course into the Sinai Desert⁹². Besides diverting water from the Nile, the 150 miles open canal will suffer enormous evaporative losses⁹³ which further complicate the calculus of future water allocation.

The failure of Egypt to seek an alternative supply of water is suggestive of the fact that it has over-relied on the Nile waters. Egypt's agriculture sector consumes most

⁸⁸ A Abu-Zeid & F El-Shibini, *Egypt's High Aswan Dam*, 13 INTERNATIONAL JOURNAL OF WATER RESOURCES DEVELOPMENT 209-217 1997

⁸⁹ Shapland, *supra* note 21, at 65.

⁹⁰ Abu-Zeid and El-Shibin, *supra* note 88, at 214. 1959 Agreement, *supra* note 5.

⁹¹ Aaron Gladman, *Massive Nile River Diversions Planned*, 12 WORLD RIVERS REVIEW June 1997.

⁹² Yeheneu Tsegage Walilegne, *The Nile Basin: from Confrontation to Co-operation*, 27 DALHOUSIE LAW JOURNAL 514 2004.

⁹³ Gladman, *supra* note 91, at 12.

of Nile water but contribute the least to Gross Domestic Product (GDP) in comparison with industrial sector. For instance, in 2001 the agricultural sector used 83 percent of Nile water and its GDP share was 16.5 percent while the industrial consumed 10 percent and its GDP share was 33.3 percent⁹⁴.

5. NEW AGREEMENT: Cooperative Framework Agreement

Without an agreeable water allocation mechanism and with realization that status quo on the Nile water usage was unsustainable, the ten riparian states established the Nile Basin Initiative⁹⁵. The ten riparian countries agreed on shared vision “to achieve sustainable socio-economic development through equitable utilization of and benefit from, the common Nile Basin water resources”⁹⁶. Recently the Nile Basin of Council of Minister 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 would facilitate cooperative management and development of the Nile. The analysis of the new agreement is not included because of its unavailability during the preparation of this article.

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

⁹⁴ Nilo Malashkhia, Social and Environmental Constraints to the Irrigation Water Conservation Measures in Egypt, Mater’s Thesis, University of Sweden 2003

⁹⁵ Brunnee *supra* note 19, at 141.

⁹⁶ *Id.*

efficient for two reasons. First, the historical anecdotal evidence indicates the existence of high transaction cost that would made it difficult to define water rights of Nile Basin states. Second, based on irrigation level investment, Egypt was the most efficient user of Nile water.

On the other hand, economic analysis of protecting Egypt's established property rights with *property rule* renders the Nile Agreement inefficient. The use *property rule* under the condition of high transaction costs empowers Egypt to monopolize the utilization of Nile. Moreover, the Nile Agreement does not obligate Egypt to internalize the externality associate to 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, water diversion supports the model.

Figure 1

