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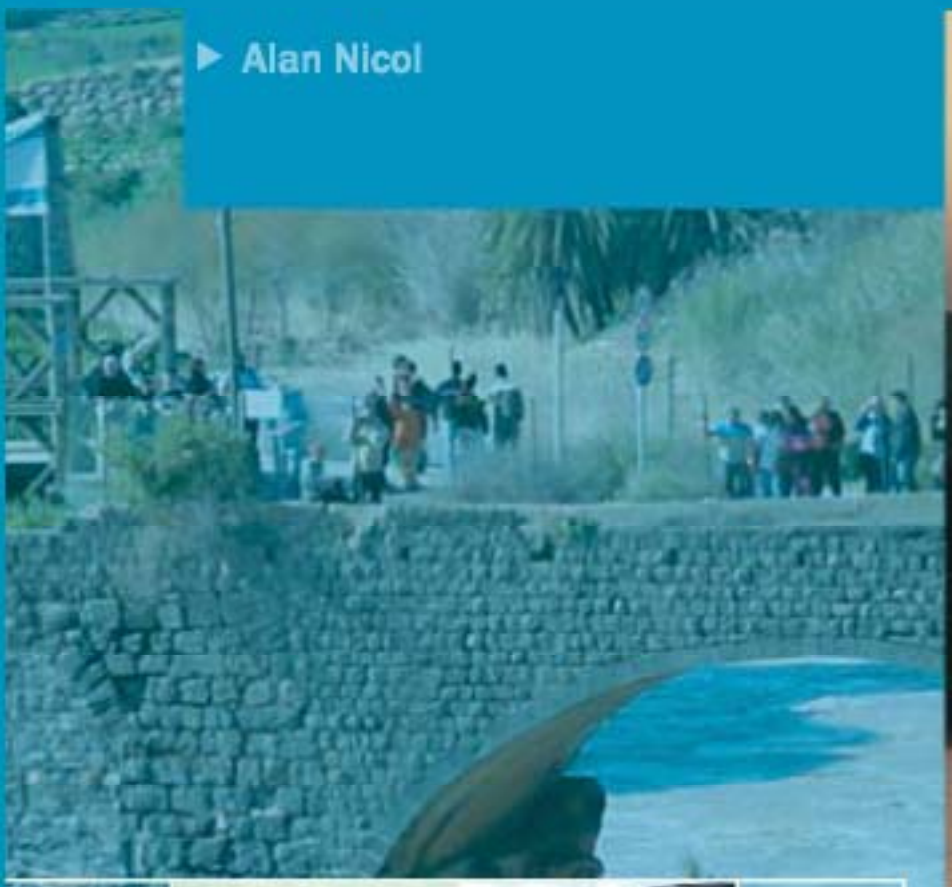
The Nile: Moving Beyond Cooperation

▶ Alan Nicol



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THE NILE: MOVING *BEYOND* COOPERATION

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With additional material from **Mamdouh Shahin**

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CONTENTS

THE NILE: MOVING *BEYOND* COOPERATION

This paper examines the development of cooperation on the River Nile. The challenge of creating a more cooperative environment for the management of Nile waters has existed for centuries. In recent years political conditions have emerged in basin countries that have provided a window of opportunity for taking forwards cooperative development of the shared waters. With the support of external agencies, since the late 1990s nine of the 10 Nile riparian countries have been setting in train a process of institutional development that has cemented cooperation and charted a way forward for future development in the Nile Basin. Yet the challenge remains to put this institutional development and cooperative thinking into practice through the development of projects of mutual benefit that are both sustainable and able to deliver benefits to the poorest.

This key challenge is now being faced by the states party to the Nile Basin Initiative. Based in Entebbe, Uganda, the NBI comprises representatives of all basin states except Eritrea and is helping to coordinate separate Vision and Subsidiary Action programs with broad development agendas. The implementation of these projects now presents the key challenge. With success in processes of cooperation, the transition to development activities needs to be made. This process has to become the mainstay of the NBI.

The paper outlines key aspects of the Nile Basin's history, geography and politics before looking at some of the legal, socioeconomic and development challenges that lie ahead. Exploring the challenges inherent in shifting from cooperation to development, the paper concludes by suggesting that a further – perhaps even more important challenge lies ahead – in terms of ensuring that development processes set in train require clear links to poverty reduction within the basin. Without these, there would be a disconnection between the goals of dispute resolution, the move to cooperation, the transition to development and the achievement of benefits for all throughout the basin.

1. INTRODUCTION

1.1. Perceptions and Realities

Perceptions and realities of water and conflict in basins such as the Nile vary widely. The river continues to be brought into debates about "water wars" by writers on the subject (see Bulloch and Darwish, 1993; Shiva, 2002 – both books entitled *Water Wars* and including key sections on the River Nile). Visions of future conflict continue to capture the imagination of the international media.[1] As recently as 1999, a BBC report on Africa's waters could still state that:

> The main conflicts in Africa during the next twenty-five years could be over that most precious of commodities – water, as countries fight for access to scarce resources … the possible flashpoints are the Nile, Niger, Volta, and Zambezi basins.[2]

Problems with portraying Africa's waters – and the Nile especially – in this light have always existed, but continuing to do so increasingly contradicts evidence that the contrary process is at work, namely moves towards greater cooperation rather than conflict.

One of the major problems with the "water wars" thesis is that it includes only a cursory understanding of "scarcity" issues, and of the actual facts and figures that underlie much of the analysis. Commonly, a threshold figure of 1,000 cu m per person per year is provided as the level below which states are said to be "water scarce." In the case of Nile Basin states, this ranks Burundi, Rwanda, Egypt, Ethiopia, and Kenya all as water "scarce" by 2025, and depending on population growth, they may possibly be joined by Tanzania.

The continuous growth of the population of the Nile Basin is one of the factors dominating these calculations. Population growth has already encouraged abstraction of groundwater, especially for domestic water supply, in both rural and urban areas without any corresponding increase in surface water resources. More than 5 percent of the water used in Egypt is groundwater. The groundwater in the Sudan is pumped from the aquifers underlying wadi beds such as the Gash, Howare, and Nyala. For rural communities, in particular, these are essential sources for domestic purposes. Safe abstraction of groundwater can provide a quick solution for small-scale projects, but in the long term will not provide basin-wide solutions to shortages in key sectors such as agriculture.

Categorizations of scarcity are usually based on an assumption about water use in each country that rarely receives careful attention. Most critical in this respect is that the threshold figure should include water for *all* uses, that is, including food production.[3] In fact, many states – and Egypt is an important example – no longer rely on *actual* water resources in combination with land and other natural resources to achieve food security, but instead import large quantities of food, and in so doing come to rely on trade in "virtual" water to sustain national food security.[4]

Another key problem is that notions of scarcity are based on a static view of the internal capacity of states to change in response to dwindling resource availability – what has been termed their "adaptive capacity." For this reason future projections of scarcity – such as those given for the Nile Basin states above – presuppose that states will not adapt effectively in the meantime, and that there are not major differences in capacity to cope with change between different states, either economically, socially, or both (the work of Ohlsson, Turton, and others takes the argument further).

For other authors, the notion of scarcity itself is sometimes part of a construction used by particular interest groups in order to legitimize certain development processes, including, for instance, the construction of major water management schemes and dams (see for example Mehta, 2000). Taken together, these conceptual

challenges demand a more careful reading of current and future scarcity of water resources, and militate against drawing overly simplistic conclusions about growing scarcity causing future conflict.

Notwithstanding these conceptual challenges, the water wars thesis is used by decision makers and by political leaders in order to focus attention on global resource issues – and their particular basin concerns. In the main, these serve immediate political ends. Boutros-Boutros Ghali is on record as stating in the mid-1980s that "The next war in the Middle East will be fought over water, not politics." And in the mid-1990s Ismail Serageldin of the World Bank warned that "If the wars of this century were fought over oil, the wars of the next century will be fought over water – unless we change our approach to managing this precious and vital resource." Such concerns and warnings rarely attempt to interrogate the realities of conflict over rivers such as the Nile, but instead feed on widely perceived notions of insecurity and vulnerability within domestic populations. These feelings are often driven by public perceptions of the challenges facing shared river basins and their societies, and the political actors are feeding on and responding to those perceptions. Some of these wider perceptions will also have resulted from external factors such as the impact of drought in the Horn of Africa and on Nile flows during the 1980s.

Nevertheless, confounding much of this skepticism, in the 1990s the countries of the Nile Basin in fact moved towards greater cooperation and joint development rather than conflict. In spite of tensions often being raised by political rhetoric within the basin, a broader vision of future cooperation constructed by the basin states has established unprecedented political cooperation in overcoming past rivalries and uneven development of co-riparian states. This article examines the context and development of this process, and draws out key lessons emerging for the future development of the basin and, more broadly, for global attempts at shifting other basins from conflict to cooperation, and then to joint development.

1.2. Initiatives and Challenges

Addressing the challenge of moving towards greater cooperation and joint development has been central to the Nile Basin Initiative (NBI), a riparian-led process of joint decision making and cooperative development that emerged during the 1990s. In the last five years nine of the ten Nile Basin states (with Eritrea observing) have been exploring the development of the NBI in partnership with key external agencies, including the World Bank and bilateral donors.[5] The NBI has both built on and added to a basic underlying set of enabling relations between states and the willingness of key basin states to move from "unilateralism" to "multilateralism" in resource development. Figure 1 depicts this shift.

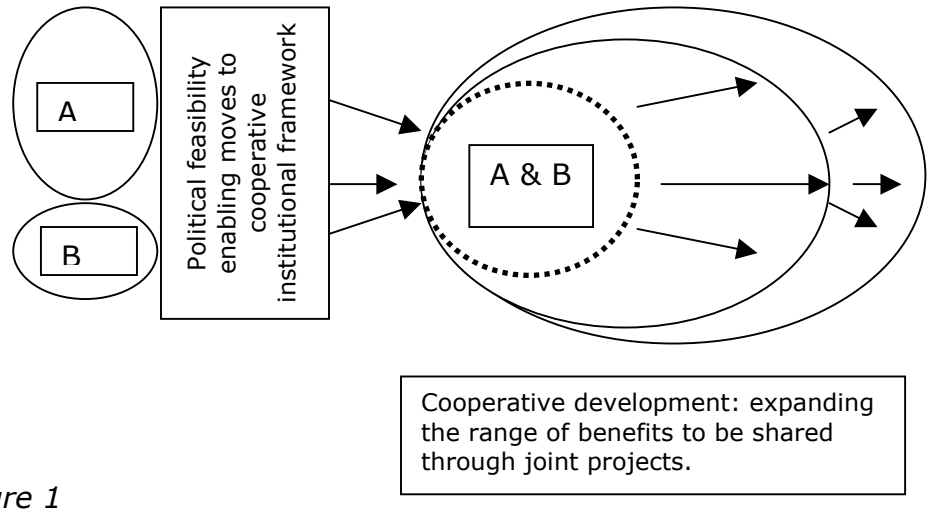

Figure 1

The development of this process was premised on two major assumptions: that the basin states could agree on a common vision "to pursue," and that they would agree to form two distinct sub-basin entities (A and B in Figure 1). The common vision (discussed later in the article) brought about a broad target for the process of subdividing the basin and developing two distinct yet interrelated basin development programs: the Eastern Nile Subsidiary Action Program and the Nile Equatorial Lakes Subsidiary Action Program. This process has subsumed national-level decision making beneath a broader basin-wide framework, but with national level objectives built into the range of future development options and projects. The process involved is discussed in more detail later in this article.

The political feasibility of the 1990s enabled much of this process to take place, and provided the basis for its mainstreaming within national-level political processes. The end of the cold war and the problems of "satellite state" politics in the region were major contributory factors in greater feasibility; another was the actual realization amongst basin states that in order to manage the river in the future, greater joint development of the resource would have to take place under a broader cooperative framework. The drought experience in a key part of the basin during the 1980s helped to form this perception.

1.3. From Cooperation to Socioeconomic Development

Developing cooperation on the Nile is a major achievement of international diplomacy within the region. It has created an environment of joint cooperation, and political will to move development processes forwards. However, the generation of support and effective development processes at all levels of society is the next major challenge. In moving a step beyond development of cooperative institutions and processes to the creation of effective developments that derive benefits at all levels within the basin, the NBI has set itself a new challenge in river basin management, and one that embeds basin-level processes in far wider African development issues.

The socioeconomic development framework requires that the benefits can be generated and shared within the basin (and within the basin states – the two not being synonymous, see Figure 3), and that the benefits can be targeted to local-level socioeconomic developments that address very real problems of poverty reduction. Under the Shared Vision Program (SVP) of the Nile Basin Initiative the Socioeconomic Development and Benefit Sharing Project document states that:

> The development objective of this project is to support the SVP by enabling the riparians to form a range of basin-wide development scenarios, and specify the benefits accruing from the implementation of such scenarios (together with some notion of how benefits will be shared). Fundamentally, the project aims to provide an opportunity for riparian dialogue that can include a wide range of society and that will develop common visions of cooperative development in sectoral or thematic areas
>
> (NBI SDBS, 2001)

One of the key concerns mentioned in the document is the extension of involvement in the Nile Basin Initiative beyond the state – that is, to include a *wide range of society*. In the process to date, and the wider construction of new political environments, the main actors in the NBI have worked at the state level. Two key issues arising out of this process are first, how to incorporate the visions and beliefs of society at all levels within this wider basin vision in order to ensure that ownership has both depth and breadth; and second, how to ensure that non-state, civil society actors also have a voice in the kinds of program that are being established. In Figure 2, "A" represents the spectrum of national views incorporated within the core NBI

vision. On either side are "peripheral" visions, or the wider thinking and views present in society on development options, the sharing of benefits and issues of governance, including participation, representation, and accountability.

Key concerns in Figure 2 are the "wider" periphery where basin developments have regional or even continental-scale repercussions, and the narrower, lower-level visioning of the process. In effect, whose process are we talking about: a national broad-based vision, or the vision of local communities whose needs and concerns are more narrowly defined by the need to survive and develop within frequently adverse socioeconomic, political, and natural environments? Both the breadth of the vision and the depth require careful linkage. In this the NBI can build very strong development-led processes that, in the final analysis, are rooted in the wider African political economy.

2. THE NILE BASIN

2.1. Geography

The geography of the Nile Basin is both distinct and varied. From the most remote source at the head of the River Luvironzo near Lake Tanganyika, to its mouth on the Mediterranean Sea, at 6,500 km the Nile is the longest river in the world. Some 2.9 million km^2 in extent, overall the basin drains about 10 percent of the continent. But the geographical and political linkages go beyond the basin itself – the ten Nile Basin states embed Nile Basin processes within the wider social and economic development of Africa across all major parts of the continent.[6] The ten Nile countries link processes in southern Africa to northern Africa and the Mediterranean, development in Central Africa to the West African Atlantic coast, and the regional systems of the Middle East to the Indian Ocean.

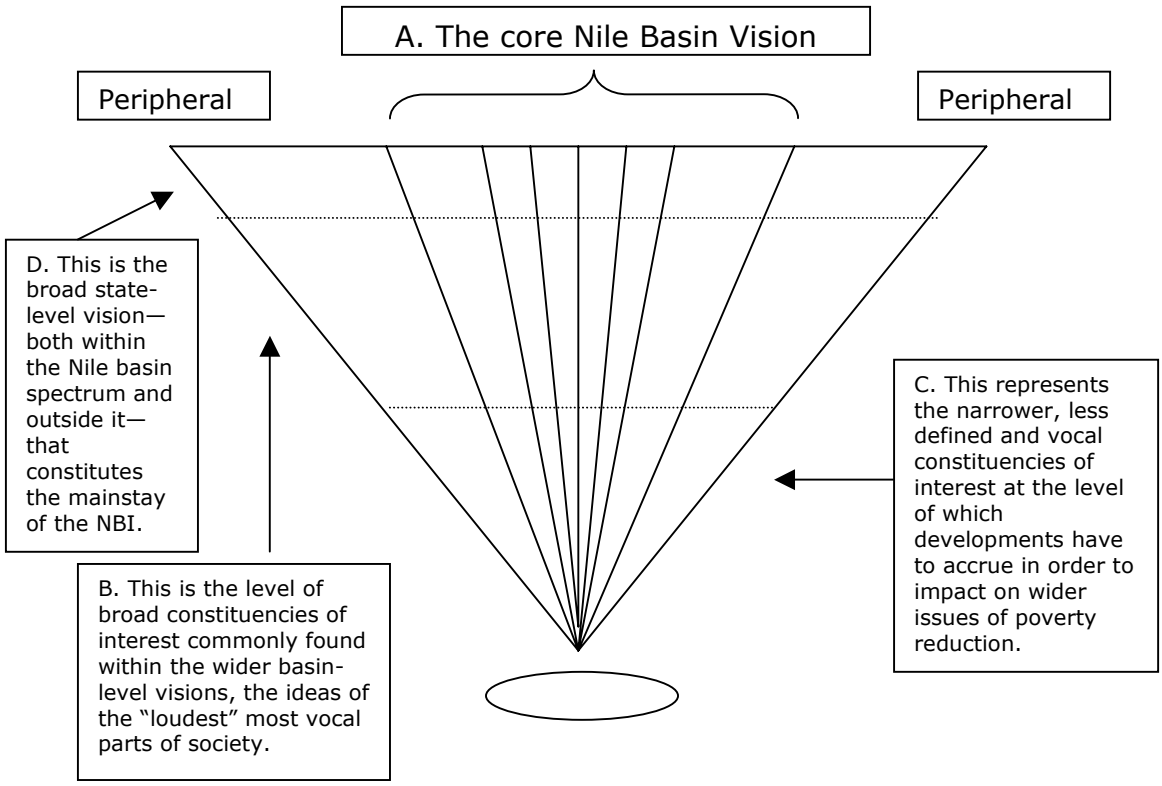

Figure 2.

From the highest point at 5,120 m above sea level in the Ruwenzori mountain range, to the Quattarah Depression, at 159 m below sea level, the river channel consists of flat reaches in certain sub-basins presently linked by steep channels. Within this basin the topography is diverse. The highlands of the Ethiopian Plateau and the "Mountains of the Moon" in Central Africa give way to the lowland pastoral plains of Sudan and the deserts of Egypt. Tropical vegetation, snow-capped peaks, and some of the driest areas in the world, as well as some of the largest bodies of inland waters, can be found along the basin's length and breadth.

The huge Congo–Nile watershed is home to internationally important rainforest areas. The Lake Victoria basin and southwestern Ethiopia include key areas of genetic plant diversity, and important dry lands and arid zone habitats emerge as rainfall decreases to the north (NBI TEA, 2001). One of the most dramatic natural features is the globally important wetland area of the *Sudd* in southern Sudan, which at 30,000 km^2 is one of the largest wetland areas in the world.

One of the key geopolitical features of the basin is the large number of national borders that traverse it. This is largely the result of European colonial or condominium occupation in the nineteenth century. With the exception of Ethiopia, whose border definition was itself a response to European colonial expansion in and around the state, border issues remained contentious in a number of places even up to the late twentieth century. The criss-crossing of borders ensures little congruence between state boundaries and the basin's physical or human geography: as a result, the proportions of basin area within each state and the extent of state contributions to the basin area vary widely, as depicted in Figure 4.

Most major basins spanning such areas include highly diverse environments, so the Nile is not exceptional in this respect. Nevertheless, the complexity of the number of states, combined with the uneven distribution of the basin between states and the complex hydrology of the system, poses significant technical and institutional challenges both for the management of shared waters and, in the future, for ascertaining where and how benefits can and should be shared within and outside the basin.

2.2. Hydrology

The Nile's hydrology has preoccupied basin residents for thousands of years, and with good reason. A large portion of the basin flows is highly seasonal, and the overall flow range is susceptible to major inter-annual and decadal fluctuations. Since the end of the nineteenth century – and in particular following British control of a key part of the Nile Basin – major hydrological investigations were undertaken to try to devise methods of controlling the river system in order to facilitate its exploitation. The flows of the Nile have been measured for thousands of years, and the origins and reasons for variations preoccupied many of the Nilotic societies. The Nilometers at Roda Island in Cairo and elsewhere along the river are testament to the huge task of trying to grapple with the fickle flows of the Nile.

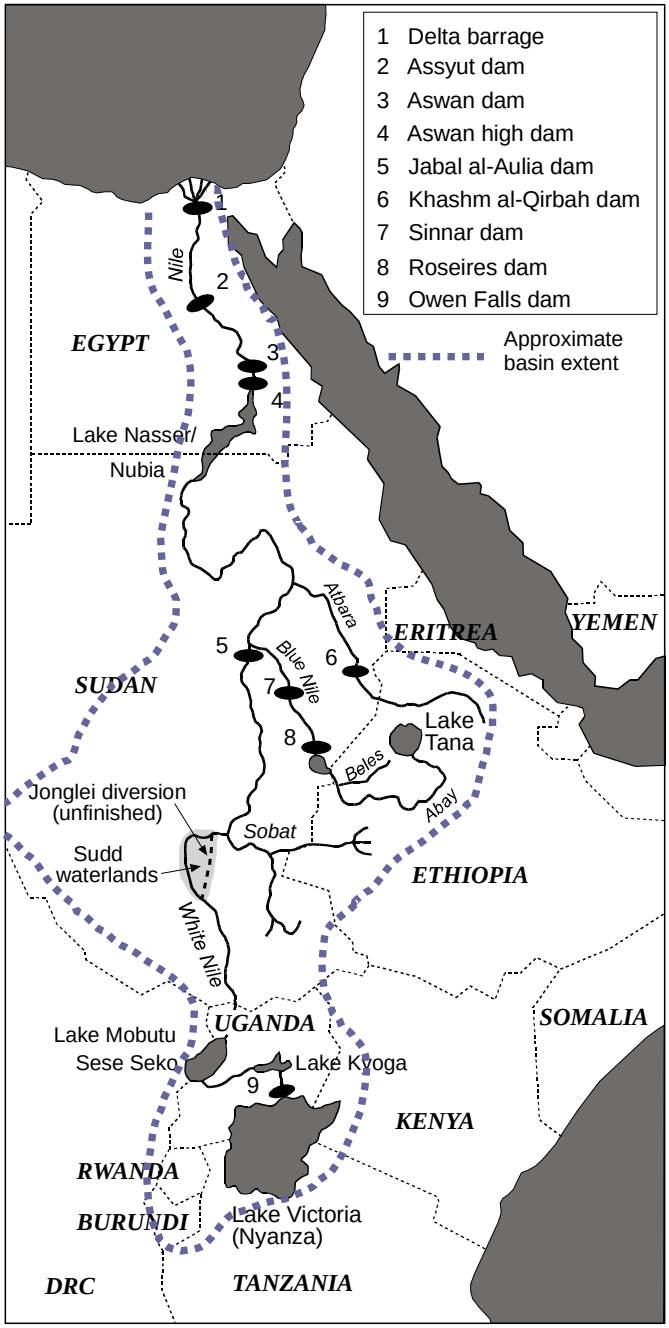

Figure 3. Map (not to scale) of the Nile Basin showing major supply structures and approximate extent of basin (reproduced with kind permission of Yasir Mohieddin, SOAS)

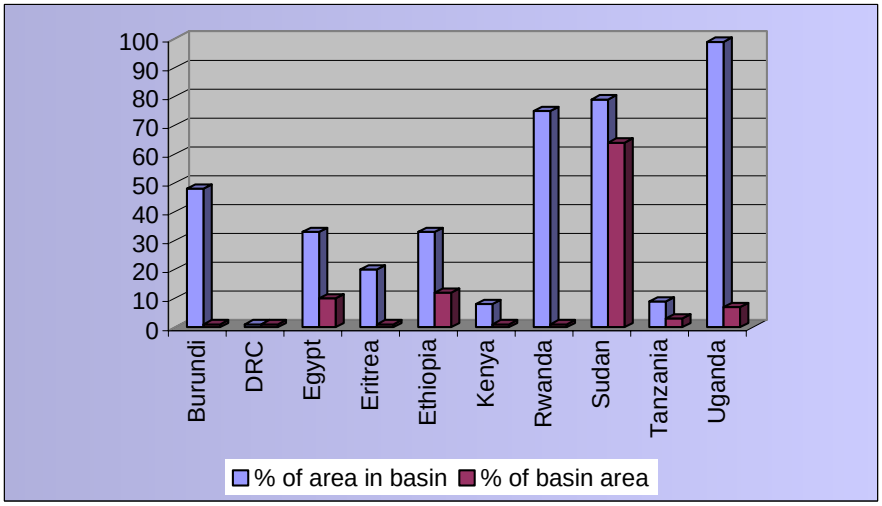

Figure 4.

Box 1. The Nile River's course

The Great Rift Valley, which runs with some interruptions from Zimbabwe to the Jordan Valley including the Red Sea, is divided into two branches in the southern part of the Nile Basin. The stretch of the western branch lying within the Nile Basin contains Lakes Edward, George, and Albert, and continues north along Bahr el-Jebel. Lake Victoria lies at a short distance outside this stretch. The lake water surface covers 67,000 km2 and has a catchment area of 193,000 km2.

The Kagera is the most upstream tributary of the Nile and most important feeder of Lake Victoria. It has a basin of 64, 000 km2, most of which is situated between 1,200 and 1,600 m above mean sea level. The Kagera Basin is a complex of streams of varying order, intercepted and interconnected by lakes and swamps. This complex includes the Luvironza/Ruvuvu, Nyavarongo, Akanyaru, and Nyaranda rivers from the west and south, and the Kalangasa, Kakiyumba, and Ngono rivers from the east.

The Upper Victoria Nile is the only outlet of Lake Victoria and connects it with Lake Kyoga. This lake is a shallow depression with a catchment area of about 75,000 km2. The runoff from Lake Kyoga flows through the lower Victoria Nile on its way to Lake Albert. Lake George is connected to Lake Victoria by River Katonga and to Lake Edward by the Kazingi channel. The Semliki river connects Lake Edward to Lake Albert. Lake Albert has a surface area of 5,300 km2 at the normal water level of 617 m above sea level and a drainage basin of 17,000 km2.

The Equatorial Lakes Plateau comprises the major Victoria, Kyoga, George, Edward, and Albert Lakes. Their surface areas are respectively 67,000, 4,760, 300, 2,200, and 5, 300 km2, and bring the total surface area covered by the lakes to almost 80,000 km2 and the sum of their basin areas to about 233,000 km2. The lakes are generally not deep. The mean depth of water in Lake Victoria is 42 m and a few meters less in Lake Albert. Next to the lakes, the Equatorial Lakes Plateau is crowded with swamps and other types of wetlands. Huge volumes of water are lost annually by evaporation from these large surfaces. The third major characteristic of the plateau is the number of falls that obstruct the river channels, rendering them unsuitable for navigation. These falls include Owen, Rippon, Marchison, Bugufi, and Bujagali.

Leaving the Great Lakes area, beyond Nimule in the Sudan, the main course of the Nile is known as the "Upper White Nile," and becomes "Bahr el-Jebel" (in Arabic) in the Sudd region. To the west, the Bahr el-Ghazal system flows to Bahr el Jebel and intersects it at Lake No. Despite its vast catchment area, 526,000 km2, the river loses most of its water through the swamps, and there is hardly any water that reaches Lake No. Bahr el Zaraf is a branch of Bahr el-Jebel, and both of them intersect the main stream, which flows from Lake No to the east until it reaches the mouth of the Sobat River. This reach of the river is 120 km long and is crowded with swamps, khors, and lagoons.

Below the mouth of the Sobat, the Nile flows from south to north until it reaches Khartoum under the name "White Nile." This stretch of the river is about 800 km long. The river reach is free of swamps but the water slope is flat and the river is sluggish. The drainage basin of the White Nile extends from the foothills of the Lake Plateau in the south to the junction of the White Nile and Blue Nile up north, and from the foothills of the Abyssinian Plateau in the east to the Nile–Congo divide in the southwest.

The Sobat has a basin area of about 220,000 km2. The Baro and the Pibor rivers are the two main tributaries of the Sobat. The basin of the Sobat comprises the Machar swamps. A considerable portion of the runoff of the Sobat Basin is lost in these swamps. Close to Khartoum, the Nile receives considerable amounts of

water from the rainfall in the highlands of Ethiopia through two main tributaries: the Blue Nile (which emerges from lake Tana) and the Atbara River.

Deep ravines or canyons in which the many of the Nile tributaries flow divide the Ethiopian Plateau. The Blue Nile Basin has a surface area of 324,000 km2. This area includes 17,000 km2 of which 3,000 km2 is occupied by Lake Tana and 14,000 km2 represents the basin area of the lake. Near Bahr Dar the lake is dammed by a lava barrier; the Blue Nile pours over it, dropping 43 m to form the Tissisat Falls. The Blue Nile and its tributaries all rise on the Ethiopian Plateau at an elevation of 2,000 to 3,000 m. A short distance downstream, the river begins to cut a deep gorge in the plateau. Several rock outcrops occur in the channel bed, the last of which are the Damazin Rapids, some 1,000 km from the river source beyond Lake Tana.

The Rahad and Dinder are two tributaries of the Blue Nile, with catchment areas of 16,000 and 8,200 km2 respectively. They rise from the Ethiopian Plateau and join its course between Sennar and Wad-Medani. The Blue Nile continues its course below the confluence of the Rahad for about 160 km. At Khartoum the Blue Nile joins the White Nile and the combined waters flow in the main Nile.

The Atbara is the last tributary of the Nile. It joins the main Nile about 320 km downstream from Khartoum. The Atbara, contrary to the Blue Nile, does not rise from a lake; instead it depends totally on many small tributaries, of which the Takeze or Setite is the principal affluent. The basin of this affluent, being 68,800 km2, constitutes about two-thirds of the 112,000 km2 total basin area of the Atbara. In its flood season the Atbara river carries a sediment-laden discharge with a concentration higher than that of the Blue Nile during its flood.

Below the mouth of the Atbara, the Nile flows in a winding channel on its way to the Mediterranean Sea without any tributaries. It traverses a series of cataracts in the Nubian Desert. The reach from the sixth cataract at Khartoum down to the first cataract, at Aswan in Egypt, is 1,880 km. The water of the Nile arriving at Aswan is impounded in a huge storage reservoir, below which water flows in a stream, traversing a rather narrow valley with minor and major bends in its course. Almost 23 km north of Cairo the river bifurcates into two branches – the Rosetta and Damietta. These two branches end at the coast of the Mediterranean Sea. These branches used to discharge the floodwater of the river into the sea during the period of September to November each year, but this is no longer the case since the construction of the Aswan High Dam.

Of particular concern for downstream riparian societies in the most arid parts of the basin were the seasonal and inter-annual peaks and troughs. These would effectively control the prosperity of the riparian societies, almost wholly dependent on river flows for agricultural production. For up to eight millennia, the very unreliability of the flow has preoccupied communities.

> That the flow could vary from year to year as well as seasonally has been recorded for many thousands of years and the awareness of Egypt's cycles of lean years followed by years of plenty was part of the way of life of people residing in the lower Nile valley before the filling of Lake Nasser/Nubia in the 1960s.
>
> (Sutcliffe and Lazenby, 1994, introduction)

The key hydrological characteristics of the river are its two major origins: in the highlands of Ethiopia and Eritrea, and in the Nile equatorial lakes region (see Box 1). The former provides the major flow of the Nile north of Khartoum – the Blue Nile – and the latter the far lower and slower flows of the White Nile. While the catchment of

the Blue Nile is small relative to that of the White Nile, high rainfall from June to September means that it is by far the greatest contributor to main Nile flows – some 60 percent of the total. The White Nile, by contrast, is derived from rainfall in the equatorial lakes region around Lake Victoria – at 69,500 km^2 the world's second largest lake – but provides a mere 30 percent of flows as measured at Aswan.

The second major feature of the hydrological system is the huge seasonality of the Blue Nile's flows, concentrated from July to October in a spectacular flood.

> From the point of view of basin development the main interest in the hydrology of the Blue Nile within Ethiopia is for flood forecasting for reservoir operation and to give warning of possible inundation in Khartoum and in the agricultural areas downstream
>
> (Sutcliffe and Lazenby, 1994)

This massive spate is roughly equivalent to seventy times its low season discharge, and brings with it huge quantities of silt. These have literally provided the building blocks of downstream Nilotic societies for millennia.

The difference in the two major river regimes is marked: while the White Nile's average monthly maximum (October) and minimum (February) discharges vary only slightly from 1.4 billion cubic meters (bcm) to 1.2 bcm, the Blue Nile and associated rivers (Atbara – which joins the main Nile at Atbara north of Khartoum – and the Sobat which joins the White Nile just as the river emerges from the *Sudd*) vary greatly from a high of 15.6 bcm in August to just 0.3 bcm in April.

This seasonal variation has posed a key challenge to river basin planners and agriculturalists alike: how to capture and store the river's waters for more gradual release. At a more fundamental level, but one that has been beyond the capacities of societies within the basin for the greater part of their history, has been the challenge of how to overcome the (sometimes) disastrous inter-annual variations in flow as well. Over the years, fluctuations in the flow of the Blue Nile have contributed changes in mean annual discharge of plus or minus 20 percent, with very severe consequences for water management in Egypt and Sudan (Conway and Hulme, 1996). The mitigation of major inter-annual variation was the task of the "Century Storage" scheme developed as a concept during the first half of the twentieth century. The idea was to capture a whole annual flood in order to fully control and regulate the river's flow. This would enable states to maximize resource use efficiency. In part the idea was realized in Aswan High Dam, constructed in the late 1950s and early 1960s, but with some major human and environmental costs.

A third major feature of the river system is caused by virtue of the river's situation in hot, arid areas where evaporation losses are high. By far the most significant losses are in the Sudd in southern Sudan. Between entry and exit the river loses up to 50 percent of its original flow. This loss to the system for Egypt and Sudan has meant significant shortfalls in summer months, when flows from the Blue Nile reach their lowest point. Therefore, enabling greater White Nile flows during this period has important economic consequences, even though it is only a relatively small proportion of annual flows. Reducing this loss was at the heart of attempts to speed up the flow through the Sudd via the Jonglei Canal Scheme.

Figure 5 illustrates the variance between "export" and "import" of water. The major production of water by Ethiopia – but low capture of the resources – is contrasted with Egypt's low internal renewable resources. This marks the nature of dependence on water from upstream catchment to downstream states in the Nile Basin. It goes a long way towards illustrating the reason the Egyptian claim on historic or acquired rights to the waters became its main stated position on the Nile waters for so long.

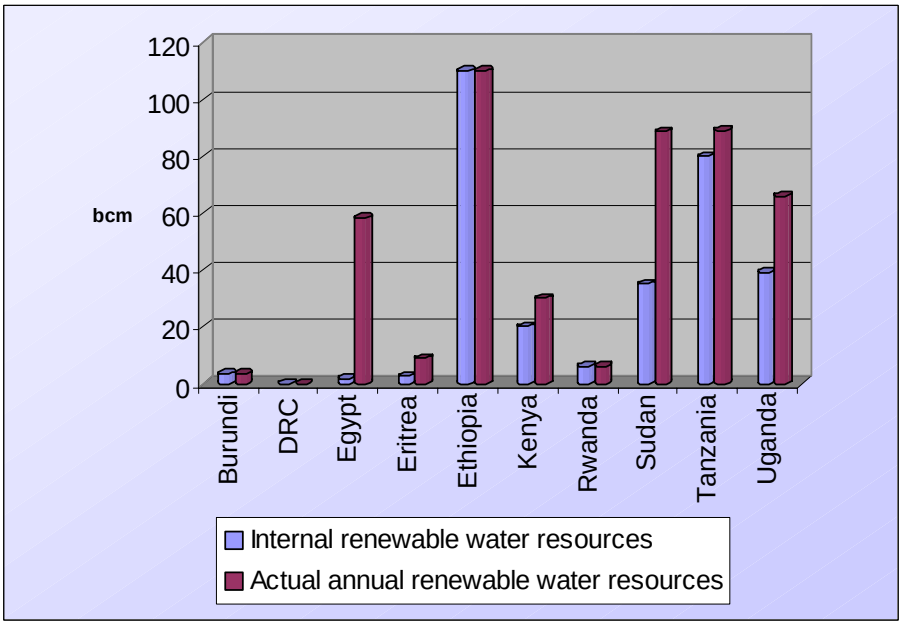

Figure 5.

Similarly, for Ethiopia, the massive amount of water generated by the huge annual rainfall, but the fact that nearly all of the 111 bcm flowed to neighboring states, prompted (until the last decade) the "sovereign right" position to use the waters within its territory for its own national development. For Ethiopia the loss of huge volumes of soil in the annual flood also underlined the fact that it could be resource rich and poor at the same time unless the resources could be harnessed more effectively. The nature of dependence on resources received externally against internal renewable resources is illustrated in Figure 6.

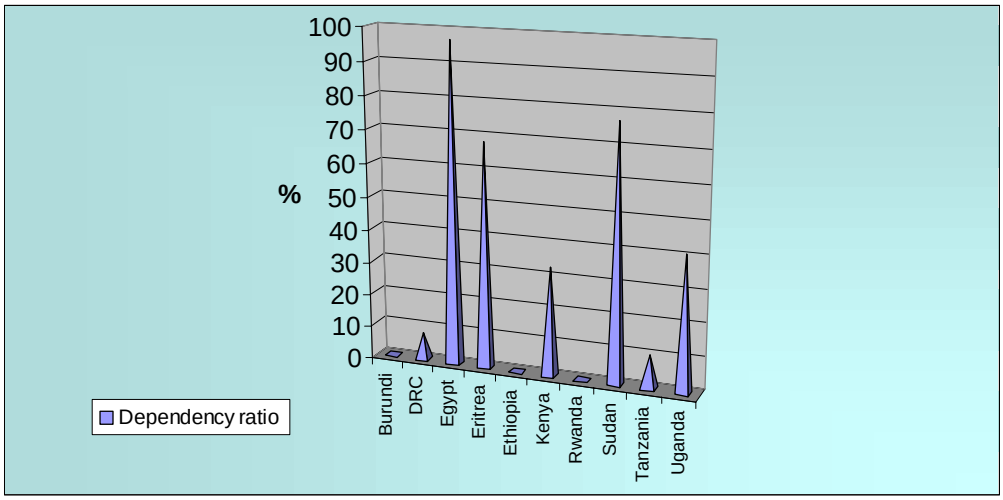

Figure 6.

Not surprisingly the huge dependence on external flows in Egypt and Sudan has driven major supply-side developments, seeking to both capture and regulate the river's flows. This has progressed throughout the twentieth century, and now constitutes the main system of regulating the river's flows. They are, as well, largely constructed to suit a particular set of demands and legal and institutional structures established between Egypt and Sudan, in particular. The future challenge of ensuring that cooperation leads to development in the future may require changes in the way

supply structures are used, as well as the inclusion of new structures in upstream countries.

Table 1. Major Nile Basin supply-side structures

Structure and Location	*Main function*	*Date completed*
Old Aswan Dam (Egypt)	To meet growing demand for summer irrigation in Egypt, saving some 1 bcm of water; heightened in 1912 and later in 1934, increasing storage capacity to 5.1 bcm.	1902
Sennar Dam (Sudan)	On the Blue Nile in Sudan, 350 km from Khartoum. Completed in 1925 to supply the Gezira Scheme. Storage of 0.8 bcm.	1925
Jebel Aulia (Sudan)	On the White Nile 44 km south of Khartoum to store water for summer irrigation in Egypt. Initial capacity of 3.5 bcm, but serious siltation reduced capacity to 2.2 bcm by 1960. Now virtually defunct.	1937
Owen Falls Dam (Uganda)	Built at the outlet of the White Nile from Lake Victoria to generate hydroelectricity for Uganda	1954
Aswan High Dam (Egypt)	To capture an entire year's Nile flood, thereby allowing Egypt complete control of Nile flows downstream. Total reservoir capacity of 157 bcm, divided between dead storage of 30 bcm, 93 bcm for live storage (the annual flood) and any remainder for extremely high floods.	1968 completed; turbines installed 1972
Kashem el-Girba (Sudan)	On the Atbara River just over the border from Eritrea. Built to serve the New Halfa irrigation scheme built to compensate Nubians flooded following construction of the Aswan High Dam. Storage in 1964 was 1.3 bcm, but fell dramatically because of siltation such that by 1971 this was just 0.97 bcm.	1964
Roseires (Sudan)	On the Blue Nile at the Damazin rapids near Ethiopia. Storage capacity of 3.0 bcm initially, leading to 6.8 bcm in its second phase. Supplies water to the Gezira Managil extensions and the Rahad scheme. Also produces hydropower for the Sudanese network.	1966
Jonglei Canal (Sudan)	Construction began in the early 1980s. By 1983, the main canal channel had been two-thirds completed before the resurgence of the civil war halted construction. Phase I was anticipated to make available some 4.4 bcm a year as measured. With Phase II, including additional storage at Lake Albert, an anticipated additional 7.6bcm per year as measured at Aswan were to have been made available.	Early 1980s

Box 2. Measuring the Nile

Garstin (1901, 1904) and Lyons (1906) gathered preliminary information about the hydrology of the Equatorial Lake Plateau. They found that the levels of Lake Victoria had been exceptionally high in 1878 and 1892–5, and that the start of gauge readings in 1896 marked the recession from a period of high water levels. Garstin (1901,1904) reported on flow measurements above and below the Sudd, suggesting that the outflow was only about half the inflow. Regular discharge measurements in the Kagera basin began in 1940, though water levels were read some years earlier (Sutcliffe and Parks, 1987).

Proper and regular stream flow measurements began around 1900, when current meters were introduced for river flow measurements. At about the same time, the staff of the Survey Department of Egypt undertook discharge measurements of the Blue and White Niles. In 1905, the Sudan branch of the Egyptian Irrigation Service was formed, and by 1912 gauges had been established on most of the important sites on the river system within the Sudan. After

becoming the head of the Physical Department of Egypt in 1915, Hurst established the network of gauges throughout the Nile Basin. The staff of the Physical Department was responsible for establishing and maintaining river level gauges on the different tributaries. They established discharge measurements and derived the rating curves for the measuring sites. The results of the work done by the Physical Department were published as successive volumes and supplements of The Nile Basin (Sutcliffe and Parks, 1999).

From about 1950 onwards, hydrological services were established in Uganda, Sudan, and Ethiopia. The Department of Hydrological Survey was established in Uganda in 1947, and became the Water Development Department in 1956. The number of stream gauging sites rose considerably in the period from 1948 to 1956. These sites were established in the catchments of Lakes Kyoga, Edward, and George. In the meantime the Irrigation Service of Egypt carried out gauging on the main river. The WMO/UNDP hydro meteorological survey of the Catchments of Lakes Victoria, Kyoga, and Albert began in 1967 and lasted for some years.

2.3. Climate

The north–south orientation of the River Nile on the African continent ensures extreme variability in climate between the extremes of the basin. The Nile Basin receives annually an average rainfall of about 650 mm, or a total of about 1,900 bcm per year. Long-term mean annual flow at Aswan is about 85 bcm per year, making the annual runoff coefficient of the basin around 4.5 percent. This figure is small and, for example, is just 10 percent of that of the Rhine. The reason for this is found largely in those parts of the basin belonging to the arid and hyper-arid zones that are large in surface area, and contribute only negligibly to basin runoff. With losses from major swamp areas as well, up to 30 percent of the rainfall the Nile Basin receives in an average year is lost before being used for any purpose.

The Nile Basin's climate range varies between extreme aridity in the north (Egypt and Sudan in particular) to tropical rainforest in Central and East Africa and parts of Ethiopia. On the Ethiopian massif, the key contributor of Nile flows, the *kiremt* rains produce the main June to November spate. This spectacular phenomenon is the combination of three mechanisms: the move of the Inter-Tropical Convergence Zone (ITCZ) (summer monsoon) over the highlands, before retreating again, the tropical "upper easterlies," and local convergence in the Red Sea coastal region. The resulting rainfall is often intense, and causes rapid runoff leading to major soil loss.

Changes to the pattern and movement of the ITCZ cause major shifts in rainfall across Ethiopia and neighboring countries, particularly in association with the varied topography in the region. In some years the northeastern highlands of Ethiopia are particularly badly affected by low and unpredictable rainfall patterns, contributing to severe crop failure, and at times major famine.

One of the key factors affecting this rainfall variability is the El Niño–Southern Oscillation (ENSO), the occurrence of positive anomalies in sea surface temperatures over the Central and Eastern Pacific Ocean, which can have dramatic global impacts on regional weather systems. In the case of the Nile, studies have shown significant correlation between the ENSO index in May and Ethiopia's *Kiremt* rainfall. Whetton and Rutherford (1994, cited by Conway et al., 1997) showed that Nile floods were significantly lower than average in all El Niño years, but that the strong relationship develops only after 1830 and continues up to the 1980s.

These variable rainfall patterns in recent years have prompted major efforts at better forecasting in the basin. In particular, the successive years of low rainfall during the mid-1980s, with floods in some years barely half a "normal" year, led to a

decline in the level of Lake Nasser/Nubia to such an extent that by the time a major rainfall event occurred in August 1988 the turbines were just short of being turned off. This experience had the dual impact of illustrating how vulnerable Egypt could be to successive low flows in the absence of the High Dam, but also the importance of a more integrated, basin-wide management regime for Egypt's water security. Successive low-flow years would require more than one massive structure to help achieve greater water security in the future; upstream augmentation of flows would also be important.

Box 3. **Rainfall in the Nile Basin from north to south**

On the Mediterranean coast mean annual rainfall is some 150 to 200 mm, most of it falling in the winter. The air temperature is strongly affected by the sea climate, making the difference between the warmest and coolest months of the year rather limited. In the Delta and Middle Egypt annual rainfall varies between 100 mm in the very north and almost zero in the south. The summer temperature is higher than that in the zone close to the sea, and the winter temperature cooler. Upper Egypt and the northern Sudan as far as Merowe have practically no rainfall and the diurnal temperature range is huge.

The central Sudan from latitude of Merowe to the latitude of Roseires has an annual rainfall belt from almost zero in the north to between 600 and 800 mm in the south. The rainfall in the south is mostly confined to July and August. The day temperatures during the months of December, January, and February are not unduly hot and the nights are cool. At the same time, the air humidity is low. The southern Sudan has rainfall at any time between February and November, and the annual average ranges from 1,000 to 1,250 mm. The maximum temperature is in March and the minimum in July and August. Humidity is low from January to March, but is high at the peak of the rains.

On the Ethiopian Plateau annual rainfall varies from 1,400 to 1,750 mm. Since the rainfall in this area equals or slightly exceeds loss by evaporation and evapotranspiration, the Ethiopian Plateau is probably the only area in the Nile Basin where there is an excess or surplus of water. At the height of the rainy season rain falls about three days out of four, but its incidence varies with locality, the maximum being reached usually about the beginning of August.

The Equatorial Lakes Plateau similarly has a rainfall that depends on altitude and the landscape of the surrounding country. The long-term average annual rainfall on the Lake Plateau (1,200 to 1,400 mm) is about 15 to 20 percent smaller than the annual rainfall in the Ethiopian Plateau.

2.4. Demography and Society

Given the large number of countries, the reach of the basin across Africa, as well as the range of agro-ecological zones, the human geography of the Nile Basin is extremely diverse. The ten states that comprise the basin cover some 300 million people, of which about 150 million live within the Nile Basin itself. The basin also boasts some of Africa's major cities, from Dar es Salaam, Kampala, and Nairobi to Addis Ababa, Khartoum, and Cairo. The latter alone accounts for probably in the region of 10 percent of the basin's total population.

The rich human geography is characterized by great ethnic, religious, and cultural diversity, cutting across national as well as basin boundaries with neighboring watersheds. This increases the complexity of the Nile's interrelationships with wider African social, political, and economic systems. For decision makers and managers

this adds layer upon layer of complexity to the ways in which the Nile Basin Initiative will develop and implement projects based on the equitable sharing of benefits between states and the ethnic groups which they comprise and, in many cases, share. Even a single state can have great diversity: Ethiopia alone, for instance, has over fifty languages and is roughly split between Muslims and Christian populations, with significant animist minorities.

Equally as important as ethnicity is the range of livelihoods associated with the demographic characteristics of the basin. For many populations within the basin, subsistence production is the mainstay of their survival, whether through pastoral livestock production in the lowlands of Ethiopia or the Sudd region of southern Sudan, or highland agriculture in countries including Rwanda, Burundi, Eritrea, and Kenya. In many cases these livelihoods are linked to particular ethnic and/or religious identities, and changes wrought externally in policy decisions over resource management can therefore have important socioeconomic as well as political consequences. In the case of Ethiopia, balancing the needs of particular ethnic regions and wider national development goals has led to the creation of a federal system based on ethnic regions.

Given the human heterogeneity of the basin, the achievement of a socially stable, politically benign environment for river basin development will always be challenging. However, there are important ways in which the development of benefits from the river's waters can form a positive feedback loop, assisting national development processes in adding advantage to deprived regions, increasing successful national integration and economic development, and eventually broadening the elimination of poverty within the basin.

3. THE DEVELOPMENT CONTEXT

3.1. History

The historical development of the Nile Basin has left a legacy of cultures and societies with a rich archaeological record. This has ensured that the basin remains one of the most distinct and visually identifiable regions of the world. The global importance of the Nile valley's archaeology has generated some of the most important international efforts at protecting archaeological sites, including the huge operation undertaken in the mid-1960s to rescue sites being inundated by Lake Nasser, following construction of the Aswan High Dam.

Beyond the archaeological significance of the river's history, it has also played an important part in early European contact with Africa, drawing explorers and adventurers from Europe as far back as the fifteenth century, many of whose exploits paved the way for future European expansionism and, eventually, colonial control.[7] With the exception of Ethiopia, a country never colonized, but occupied for five years by Italy, much of this European control was not relinquished until the mid-twentieth century.

The recent historical development of the Nile Basin includes three major phases over the last 150 years. The first phase from the late nineteenth century to after the Second World War was an era of almost total social and economic domination by European powers. From after the Second World War to the late 1980s there was a period of colonial "unbundling" of control and exploitation, giving way to ideologies and political systems influenced by the state ideologies developing within the cold war bipolar world. Frequently, the legacy left behind was one of competing nationalisms between newly independent states, and within the more centrally controlled states, challenges to state legitimacy by rebel groups.[8]

The third major shift has taken place from the end of the 1980s onwards. As the cold war gave way to a new system of global political control dominated by one

superpower, realignments, regime change, and new policy directions emerged during the 1990s. In particular the economic situation of many basin states shifted to more open, free-market economic systems causing major social and economic wrenches. It is within this era of substantial social, economic, and political change that the emergence of the Nile Basin Initiative has taken place and the major ideas and concepts of the Nile Basin Initiative have been framed.

3.2. Contemporary Politics

This era of superpower "satellite" politics in the basin witnessed key state development processes including, in the case of Egypt, heavy reliance on an "import substitution" model up until the end of the 1960s. In other states including Sudan, Tanzania, and Ethiopia, the command-led approach to economic development was supported at various points by strong trading links with the Soviet Union. Many states continued interventionist economic policies up until the late 1970s. Ethiopia remained an exception until the late 1960s, and went in the reverse economic direction to many other basin states during the 1970s, increasing its level of centralized, state-led development under Mengistu Haile Mariam. Indeed, as Egypt under Anwar Sadat approached a new era of "*infitah"* – or the "opening up" of the economy – Ethiopia under Mengistu Haile Mariam undertook major nationalization of capital assets, including land.

During the 1980s conflicts in key Nile states re-emerged, including civil conflict in Sudan, and in Ethiopia a new intensification in the civil war, with rebels emanating from northern parts of Ethiopia and Eritrea (a province of Ethiopia at that time) fighting to overthrow Mengistu's government. The military support provided by different sides based on regional and international cold war allegiances – in particular the role of the Soviet Union in providing concessionary oil and huge amounts of military hardware to Ethiopia – helped to fuel and prolong the conflicts. Many of these arms remain in the area and help to fuel smaller conflicts at the local level.

Because of this reliance on external support, with the rapid collapse of the Eastern bloc in the late 1980s major political changes took place in Ethiopia, and by 1991 the government had fallen to the rebel groups.

In parallel with statist ideological development at this time, there were other strands of thinking developing more widely in the region that challenged both secular concepts of socialist and capitalist development, namely the emergence of a form of political Islam. By the late 1980s this had influenced the formation of a new government in Sudan, and for most of the 1990s has shaped both external, international relations between Sudan and key states in Western Europe and the United States, and regional-level relationships.

Under this shifting mosaic of ideological and political developments, the contemporary politics of the region have frequently been extremely violent, from local to national to international level. In recent years major wars have been fought between co-riparian states and/or their proxies, including the Ethiopian–Eritrean "Border War" in the late 1990s, the ongoing conflict in the Democratic Republic of Congo, and conflict in Southern Sudan. While the River Nile is a single physical unifying factor, its broader socioeconomic and political capacity to unify has yet to be developed.

3.3. Legal Issues

The legal regime on the Nile is in theory governed by rules and norms of international law on the sharing of international waters that emerged during the twentieth century, partly in response to the untenable "Harmon Doctrine." Until the middle of the nineteenth century this doctrine had inferred absolute sovereignty of the state over its

territory, and by extensions, a freedom to do what it wished with waters flowing in international rivers through that territory. Subsequently both the Helsinki Rules of 1966 and the ILC rules brought in concepts of cooperation, equitable distribution of waters, due consultation over proposed projects, and adequate compensation. By the latter part of the twentieth century the International Convention on the Non-Navigational Uses International Water Courses (UN) brought in a substantial body of international law that included principles on sharing benefits, as well as waters. To date the Convention has not been ratified by any Nile riparian state.

Specific to the Nile Basin itself, there have been a great number of legal documents and diplomatic exchanges on the sharing and use of the Nile's waters since the latter part of the nineteenth century. (The major instruments are tabulated in Table 2.) They illustrate clearly the ways in which competing interests on the Nile have vied to assert control, if not sovereignty, over the access to the waters of the Nile, largely through bilateral agreements – and often between very unequal negotiating entities.

One of the key challenges underlying development of the current initiative is the need to move beyond bilaterism in the achievement of future agreement on legal principle, while not starting full renegotiation of existing treaties. In many ways the process has moved beyond the need for future treaties. This "backgrounding" of legal issues in managing and allocating the Nile waters reflects an important shift in the way such issues are perceived and used by the riparian states themselves. They have moved from an earlier era of bellicose assertions of prior, historic rights and national sovereignty over water courses, to a "common vision" of development of the Nile that seeks: "to achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." The significance of this joint statement lies in its emphasis on equitable usage and socioeconomic development. It demonstrates a shift to a view of sharing between states based on maximizing shared benefits, rather than focusing on the water resources themselves. There is a significant reflection of the UN Convention on the Non-Navigational Uses of Watercourses in the vision, namely the usage of the term "equitable." For downstream states this represents acknowledgement – albeit implicit – of the need (if not the right) to upstream water resources development which at some point will impact on shares as currently allocated under the 1959 Agreement (see Table 2). For upstream states this also implies the redundancy of insisting on renegotiations as a starting point if, in many senses, the NBI has taken their position beyond the negotiating table and directly to the implementation of actions on the ground within a cooperative framework.

None the less, the 1959 Nile Waters Agreement remains the point of departure for Egypt and Sudan, certainly in terms of their bilateral relationship, and under it, they form in effect a "joint position," on the NBI. It is also important to see the Agreement in the context of regional political development at the time. For both states – but in particular Egypt – it represented important new expressions of independence that were extremely politically symbolic.[9] For Egypt, the Aswan High Dam represented a historic solution to its perceived water insecurity, namely the capture of an entire annual flood under one structure lying wholly within its territory (although the reservoir stretched far into Sudanese Nubia). The 1959 NWA for Sudan also represented a major improvement in its share of the Nile waters (see Table 2 for a comparison with the 1929 Agreement).

The NWA effectively divided all the Nile waters between the two riparian states on the basis of an assumed annual average discharge as measured at Aswan of 84 bcm. The division – 55.5 bcm to Egypt and 18.5 bcm to Sudan – took into account anticipated losses to evaporation in the soon to be constructed Lake Nasser/Nubia of some 10 bcm per annum. The key legal principle within the Agreement was expressed as "present acquired rights." Historic patterns of usage took precedence, in effect,

over the future need of other upstream states. Ethiopia took exception to the Agreement and refused to recognize its legitimacy.[10] Nevertheless, until very recently the NWA remained the basis of the position taken by the two key riparian states (see Table 2).

Ethiopia's position was strengthened at the time by the strong connection to US foreign policy interests. With Egypt moving towards the Soviet sphere of influence, the United States took advantage of Ethiopia's reaction to the NWA by proposing a study of the development of the upstream Nile waters in Ethiopia. By 1964 the US Bureau of Reclamation had produced the Blue Nile Waters Study, which included proposals for a series of huge dams and irrigation schemes in Ethiopia. These projects never came to fruition, yet helped to stoke Egyptian fears surrounding the actions of upstream riparians.

3.4. Socioeconomic Development

The hydrological and geographical variability of the Nile Basin are matched by socioeconomic differences between countries. The range of income levels and the structural differences between national economies spans Egypt – a middle-income, industrializing nation – at one end of the scale, to many upstream states that in an economic sense are a fraction of the size of Egypt and are weighed down by debt, static or declining economies, and huge externalities caused, amongst other things, by internal conflict and the impact of diseases such as HIV/AIDS and malaria.

The significance of agriculture in the different economies also varies widely as a proportion of GDP, which is of key significance in terms of water usage. Workers engaged in agriculture constitute 80 to 90 percent of the total workforce in the Equatorial Plateau and East African countries. This drops to between 70 and 75 percent in Congo and the Sudan and to 42 percent in Egypt. Similarly, the proportion of hydropower produced by the various states is related in many cases to the seasonality of flows, the capacity to capture the resource, and the relationship of water storage to irrigation potential. Internal food production as opposed to import dependency varies in both type (staple foods) and quantity (proportion purchased externally and/or provided in the form of food aid).

The key issue arising out of this diversity of contexts, which is of relevance to turning cooperative frameworks into long-term development processes, is that the solutions to benefit sharing have to begin with the actual needs of people. At the most basic level the ten states vary hugely in population terms, from over 60 million in each of Ethiopia and Egypt, to under 10 million in Rwanda, Burundi, and Eritrea. Half of the states have populations of over 20 million, ensuring that the development needs vary hugely in qualitative and quantitative terms.

There are also great variations in livestock populations and in area and population density, from just 26,300 km^2 in Burundi to Sudan, which at 2,505,800 km^2, is the largest state (by area) in Africa. There are implications for the integration of remoter areas of the basin within new development processes.

At a macro level, Egypt's economy dwarfs all the other economies (see Figure 7). GNI per head ranges widely, from only US$100 in Ethiopia to more than fourteen times that amount –US$1,490 – in Egypt. In addition, the proportion of the amount that accrues to agriculture in Ethiopia is substantially more than in Egypt.

Table 2.

Date	*Countries*	*Agreement*
1891	Great Britain and Italy	Protocol on demarcation of respective spheres of influence in Eastern Africa. Third article stipulates that Italy pledges not to construct on the Atbara River any irrigation work that could significantly affect the Atbara's flow into the Nile (at a time of Italian colonization of Eritrea).
1902	Great Britain and Italy, and Italy–Ethiopia	Treaties related to the frontiers between Anglo-Egyptian Sudan, Ethiopia and Eritrea, signed in Addis Ababa on May 15 1902. In the Third Article, Emperor Menelik II pledged not to construct or allow to be constructed any work across the Blue Nile, Lake Tana, or the Sobat River, that could hinder the flow from their waters into the Nile, except with the agreement of Great Britain and the Government of Anglo-Egyptian Sudan.
1906	Great Britain and Congo	Signed in London on May 8 and brought a modification to the Brussels Agreement of May 12 1894; in the Third Article of the 1906 Agreement the Congo undertook not to construct or allow to be constructed any work on or near the Simliki or Isango rivers, which might reduce the volume of waters flowing into Lake Albert, except in agreement with the Government of Anglo-Egyptian Sudan.
1925	Great Britain and Italy	December, in which, inter alia, the Italian government recognizes the previously acquired hydraulic rights of Egypt and Sudan in the waters of the Blue and White Niles, and engages not to construct on the headwaters of the Blue Nile or White Nile, or their tributaries and effluents, any work which might substantially modify their flow into the main river.
1929	Great Britain and Egypt (the former on behalf of Sudan, Kenya, Tanganyika, and Uganda)	Treaty stipulates that no work of any kind may be undertaken on the Nile, its tributaries, or on the lakes which form its course, without Egypt's consent; and in particular if these works are related to irrigation or power generation, or if they affect the volume of waters which reach Egypt or in any other way be detrimental to Egypt.
1934	Great Britain (on behalf of Tanganyika) and Belgium (on behalf of Rwanda and Burundi)	Concerning the Kagera River flowing into Lake Victoria and stipulating, inter alia, that the contracting parties pledge to return to the River Kagera, before it reaches the common borders between Tanganyika, Rwanda, and Burundi, whatever amounts of water might be diverted for power generation projects.
1953	Great Britain (on behalf of Uganda) and Egypt	Exchange of notes from July 1952 to January 1953 on Egypt's participation in the construction of the Owen Falls Dam for the generation of hydropower in Uganda. It was agree to heighten the dam so as to raise the water level in Lake Victoria, allowing Egypt more water for irrigation while the hydropower generation would allow more electricity for both Kenya and Uganda.
1959	Sudan and Egypt	On November 8, for the maximum utilization of the surplus waters by the two countries and the utilization of the surplus waters resulting from the construction of the Aswan High Dam. The average annual flow of 84 bcm was divided between the two; Egypt receiving 55.5 bcm, Sudan 18.5 bcm. Some 10 bcm being assumed lost to evaporation from Lake Nasser/Nubia.

(Source: S. Ahmed in: Howell and Allan, 1994)

Table 3. Key eastern Nile riparian positions (to 1998) prior to the Nile Basin Initiative

Egypt	• Under the 1959 Agreement entitled to 55.5 bcm per annum • Until the early 1990s refused to discuss Ethiopia's intentions to develop the Nile waters • Publicly regarded 1959 NWA as defining its "minimum entitlement" • Recognized Sudan's entitlement to 18.5 bcm, and opposed reduction to 'historic' entitlements. • Prepared to jointly develop schemes including the Jonglei in Sudan • Government agencies concerned with water and land reclamation strongly protected the notion that they had options for substantial increased use of water, and proposed a 25 percent increase in the area under irrigation; these schemes go far beyond what is possible with known water resources and existing institutions, but played to the international legal and relations imperatives of projecting vigorous future water demand.

Sudan	• Its position was largely dominated by Egypt. NWA included provisions on monitoring by Egyptian engineers of Sudanese usage. • Had 1960s and 1970s trends in development been sustained, would have been utilizing its full entitlement by the 1990s; in the 1980s the pace of agricultural development declined and some land came out of production. It is still probably only utilizing some 14–15 bcm of its entitlement. • Sudan watches Egyptian use carefully, including the al-Salam canal diversion to Sinai; many were particularly exercised when Egypt spoke of transferring water across Sinai to Israel in late 1979. • The Jonglei scheme was facilitated by the NWA in the early 1980s. Its original intention was to reduce evaporation losses from the White Nile as it moved through the Sudd, thereby increasing water supply to the north (and Egypt). However, the decision to construct – made in 1974 by the northern government – failed to take into account impact on southerners and was a partial catalyst for the resurgent civil war.
Ethiopia	• In the past noted with alarm plans by Egypt to move water outside the natural Nile Basin (to Sinai). • In the past has not been able to develop its immense hydropower potential or to address the more difficult water for agriculture issues. • Gradual utilization through construction of small dams in the highlands increased in the 1990s, but these projects were subject to severe environmental degradation problems, and continue to be so. • The upstream riparians – including Ethiopia – regarded the negotiation of the 1959 Agreement as an essential preliminary to any future agreements on the Nile. Under the Nile Basin Initiative these demands have been subordinated. • Ethiopia has been attempting to gain recognition of its right to develop water for power and agriculture. In 1997, for the first time, the Egyptian government stated that the two governments – as the major suppliers and users of the resources – should discuss issues bilaterally, which led to an historic exchange of diplomatic notes. • This provided the precursor to agreement on entering into the Nile Basin Initiative in 1998.

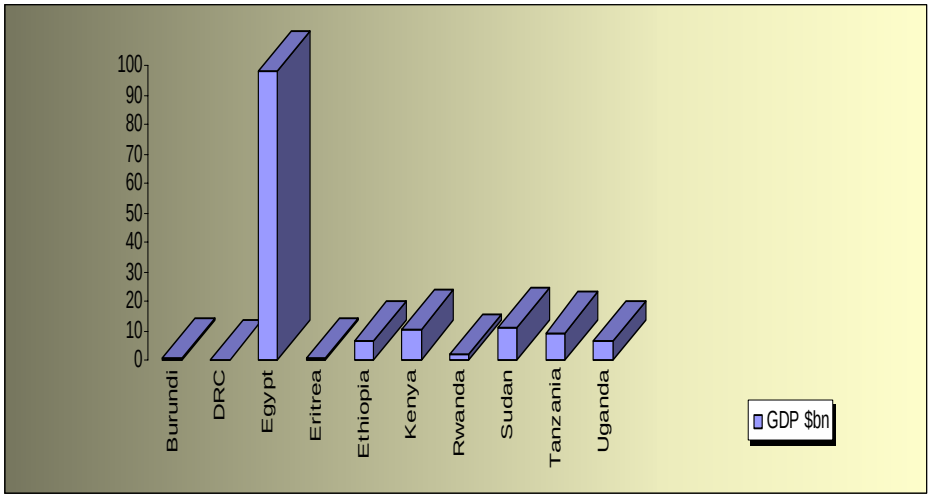

Figure 7.

Table 4. Socioeconomic differences between states

Country	*Pop.*	*Surface area (1997): thousand sq. km*	*Pop. per sq. km (1997)*	*Pop growth %*	*GNI per capita US$*	*GDP : billion US$*	*Domestic water supply coverage (%) Rural/ Urban*[1]		*Internal renewable water resources per caput (m3/yr)*[2]
Uganda	22	241	111	3	310	6.3	46	72	1 891 (1994)
Tanzania	33.7	945.1	38	2	280	9.3	42	80	2 773 (1994)
Sudan	29.7	2,505.8	12	2	320	11.2	69	84	1 279 (1995)
Rwanda	8.5	26.3	345	2	250	1.8	40	60	833 (1993)
Kenya	30.1	580.4	53	2.3	360	10.4	31	87	739 (1993)
Ethiopia	64	1,104.3	64	2	100	6.3	13	77	2 059 (1994)
Eritrea	4	117.6	41.	3	170	0.6	42	63	815 (1994)
Egypt	63.8	1,001.5	64.1	1.8	1,490	98.3	94	96	29 (1994)
DRC	51.3	2,344.9	23	3	n/a	N/a	26	89	21 973 (1994)
Burundi	6.8	27.8	265	2	110	0.7	61	96	579 (1994)
Total	313.9	8,893.9	1,016	23.1	n/a	144.9	n/a	n/a	n/a
Average	31.39	889.39	101.6	2.31	376.6[a] (237.5)[b]	16.1 (5.8)[c]	46.4	80.4	3 297 (1,099.7)[d]

1. Figures are for 2000. From the WHO and UNICEF Joint Monitoring Program "Global Water Supply and Sanitation Assessment Report"
2. Figures are from FAO (1995) Irrigation in Africa in Figures. *Water Reports 7*, Rome, FAO.

a. Not including Democratic Republic of Congo; b. this figure not including Egypt and DRC; c. this figure is for the eight basin states not including DRC and Egypt; d. this figure is not including DRC

The concept of "benefit sharing" mentioned earlier neatly encapsulates one key issue in any basin-wide cooperative process. That is the creation of more equitable development within the basin, and the flattening of charts such as Figure 7. Clearly linked to this issue is the need to turn the Nile's development into economic growth and stability in the nine other major basin states. Yet, within this hugely diverse social and economic environment, inhabited by economies with few major linkages between one another and with massive divergence in financial strength, economic structure, and growth trajectories, building an equitable basis for benefit sharing will be difficult. One starting point may well be a clearer focus on addressing poverty, defined in human development terms.

These disparities in poverty reduction capability in the basin, and the difference in scope and extent of poverty, ensure that benefit sharing needs to have a basic poverty focus, even to the extent that cross-subsidization of poverty reduction approaches might take place between states as part of the benefit-sharing process. Some of the development trajectories and possible poverty challenges arising under the NBIs program of work are outlined in Table 5.

3.5. Information and Data Issues

The issue of information and data use is central in assessing and responding to the development needs of basin states as well as developing effective and transparent institutions and processes of cooperation. Part of the challenge is knowing how and where to develop the basin resources in order to maximize benefits for states through more efficient as well as equitable use of the resource. Much of the data management environment to date has focused on river flows, addressing the problems of water management mentioned earlier.

Table 5.

Development opportunity	*Poverty challenge*
Water for agriculture Small-scale irrigation Large-scale irrigation Water harvesting Agro-well development Small-scale dam development	Farmer knowledge and capacity: is this to be built into new irrigation projects? Farming viability (link to environment; tenure; climate issues); how important are environmental issues? Marketing versus subsistence – who are the poor? At what level will water development benefit subsistence and small-scale farmers? Governance issues – what sort of management structures on irrigation projects will be most relevant and cost-effective? How will participation and stakeholder involvement be factored in?
Water for energy production Large-scale hydropower Power trade Small-scale hydro local trade Rural electrification programs	Demand for energy in rural areas is a crucial factor in both livelihood security and environmental impacts. How will hydropower address this need? How will it be built into issues of deforestation? Impact of infrastructure development on displacement and social development will require mainstreaming of guidelines on resettlement within the NBI. Urban–rural issues and development trajectories will be closely linked to energy production and where energy generated is transferred. Will there be an urban bias? In some countries there will be a trade-off between conventional hydrocarbon based energy production and hydropower development (Sudan being a case in point).
Environmental protection (better water management) Increased soil projection/ better soil fertility Fewer floods Less damage to hydro-dams More soil moisture/aquifer recharge (more groundwater for domestic uses) Less displacement by flooding	Protection versus "control"; there are important social factors to include in environmental protection. It can have local externalities as well as benefits, although it might have non-local win-wins. Which livelihoods groups (e.g. grazing impact, pastoralist, versus agriculture, ox-plough) are affected? Benefits of increased soil moisture if protection and recharge are combined (small dams as a post protection intervention?) Increased hydro capacity downstream, more power availability.
Information sharing Hydro-agricultural data Hydro-meteorological data Trade and economic data Socioeconomic data	Opportunities for data devolution to local government What better data assists in developing depends on how it is combined with other assets – financial, physical, and human – at a local level.
Training, confidence-building, stakeholders Water management Socioeconomic assessment Participation and governance skills	Local government water needs prioritization. Assessment of livelihoods impact of interventions. Creation of more coherent water management strategies at a local level (perhaps NBI "cadres" at a local level) to include local poverty reduction initiatives.

Data collection on the Nile provided the thread that wove together early attempts at collaborative development. However, on its own it falls far short of providing a sound framework for development and of overcoming differences and disputes between states. This partly reflects the concern felt by some states that earlier efforts were little more than a distraction from key water allocation issues.

The history of collecting data on the Nile is thousands of years old, and testament to this is the proliferation of Nilometers along the river, the best-preserved being the Nilometer on Roda Island, Cairo. However, apart from the sharing of data between British experts under condominal and colonial control in the nineteenth and early twentieth century, it was not until the 1960s that concerted data sharing was attempted. The Hydromet project (initially driven by the rising levels of Lake Victoria caused by exceptional rainfall in the early 1960s) was established in 1967 between Egypt, Kenya, Sudan, Tanzania, and Uganda. Supported by the UNDP and the World Meteorological Program, its objectives included collection and analysis of data for the Lakes Victoria, Kyoga, and Albert catchments and a study of the water balance of the Nile. However, regional political difficulties in the 1970s forced the project's premature closure following the withdrawal of Kenya and Tanzania. It ended officially in 1992.

More recently, significant data acquisition models have been developed by, amongst others, the Food and Agriculture Organisation of the United Nations (FAO) under the auspices of projects including "Operation Water Resources Management and Information Systems for the Nile Basin Countries," and "Information Systems for Water Resources Planning and Monitoring in the Lake Victoria region." These projects have included significant capacity building elements in Upper Nile countries, related closely to monitoring improved sustainable water resources development.

In the early 1990s, Tecconile came into being, supported by CIDA, and included elements concerned with strengthening data processing and GIS/Image Analysis Systems and the implementation of basin-wide networking on data sharing. Tecconile covered nine basin states, with Ethiopia and Kenya acting as observers. Its longer-term objective was to help develop and conserve the Nile waters in an integrated and sustainable manner and to determine the "equitable entitlement" of each riparian state to use of the Nile waters. In the short term the idea was to develop national master plans and to integrate these plans into a wider Nile Basin plan. The original institutional model included the establishment of a Council of Ministers (meeting once a year) and a Technical Committee. While in its own terms the project did not develop to completion, it provided the seed for more concerted efforts at achieving substantial socioeconomic and political cooperation on the Nile. This is examined in the next section.

4. THE DEVELOPMENT CHALLENGE

4.1. Building a Cooperative Framework (the 1990s)

As preceding sections have shown, cooperative development of the Nile has, in practice, been undertaken for many decades. However, the level of cooperation has not been anywhere near effective or comprehensive enough to address the growing demand for water both upstream and downstream in the basin.

Earlier sections have illustrated how external political conditions to enable cooperation were not in place until fifteen years ago. Their eventual emergence has subsequently enabled the rapid development of an institutional structure and decision-making process that has radically transformed the development environment in the Nile Basin since the early 1990s.

A number of international meetings took place regarding the Nile (including one hosted in London and another in Cairo during the early part of the 1990s) in response to both the opening up of political space within the basin and a growing awareness that future development options would require more strategic and multi-sectoral thinking. This changing landscape culminated in the meeting of Nile Water Ministers in December 1992 at which the Tecconile project was established for a transitional period. The Tecconile initiative resulted in a basin-wide "action plan" – the Nile River basin Action Plan (NRBAP), supported by the Canadian International Development Agency (CIDA). In tandem a series of Nile conferences – Nile 2002 series – started in 1993 bringing together "technical experts" from all Nile Basin countries. Subsequent meetings were held in Khartoum (1994) and other states of the Nile Basin including Ethiopia in 1997. Originally launched "to provide an informal mechanism for riparian dialogue and the exchange of views between countries, as well as with the international community" (NBI, 2001), the meetings also enabled informal contact between officials of riparian states and with external "facilitating" organizations.

Approved by the NileCOM in Arusha in February 1995, the NRBAP included sections on:

a) integrated water resources planning and management
b) capacity building

c) training
d) regional cooperation
e) environmental protection and enhancement (mainly concentrating on the White Nile).

It became, in effect, the template for the much larger Nile Basin Initiative later in the decade.

Although initially Egypt was the main instigator of Nile technical dialogs, and Ethiopia remained an observer to such dialogs (skeptical of what it saw as slow processes with little effective dialog on key issues), by the early 1990s Ethiopia itself had begun to demand a more comprehensive basin-wide organization "agreed upon by all co-basin states." Ethiopia submitted a "framework of cooperation" between the Nile River co-basin states for the Undugu meeting held in Addis Ababa in May 1992.[11] The country remained dubious as to the strength and importance of some of the earlier efforts, but reaffirmed its commitment to a major new undertaking at the Second Nile 2002 meeting in Khartoum held in 1994:

> There have been various efforts to bring about cooperation among the Nile co-basin countries, most of which have been initiated under the auspices of the UN agencies. Yet, these initiatives have not been success stories because of their narrow scope and failure to address the real issues involved within the Nile Basin. Some of the major cooperative efforts that have been initiated within the Nile Basin include: the Hydromet Project, the Bangkok Ministerial Meeting, the ECA/UNDP initiative, the Undugu Group, two FAO initiatives on basin-wide water resources information system, the UNEP initiative on Environmental Action Plan, and the Tecconile as a follow up to the Hydromet project.[12]

In public there was continued jockeying for position between key riparian states in the mid-1990s. It was an important time of "position definition," including, at a bilateral level, between Ethiopia and Sudan. The former was pressing its case for a more comprehensive understanding of "equitable utilization" whilst the latter (as well as Egypt) argued that Ethiopia did not share the same dependence on the Nile and had other major water sources that could be exploited. A Sudanese official's reply to Ethiopia's concern that equitable utilization be examined more comprehensively made the point that:

> In our opinion the water national master plan should comprise the waters [of the Nile] and other water resources because the relevant factors to be considered for the equitable entitlement include the knowledge of available water resources other than the shared basin.[13]

Nevertheless, the shift in thinking by Ethiopia was picked up quickly by Egypt, and in 1994 the then Egyptian Minister of Public Works and Water Resources reflected the major shift in Egyptian thinking on the Nile, stating that:

> Egypt supports without reservations the development process in Ethiopia for the benefit of the Ethiopian people, especially in the Nile Basin Region, within the context of constructive consultations and a real start for confidence building, clearness, and transparency. The outcome result will, I am sure, be a win game.[14]

4.2. Institutionalizing Cooperation (the NBI)

In spite of the *glasnost* in relations between formerly belligerent co-riparians, moving from relations characterized by political conflict to new forms of cooperation required significant institutional development. It was not sufficient that the countries were now in a position to develop institutional cooperation; they required external assistance in order to facilitate this process. In 1997, the Nile Ministers requested that the World Bank establish a fundraising group for cooperative projects on the Nile. The Nile Basin Initiative that developed out of this request represented a re-emergence of the earlier NRBAP. It now forms the most important basin-level approach to cooperative development of the Nile waters ever undertaken, and its significance extends well beyond the basin itself.

The Nile Basin Initiative describes itself as a "transitional arrangement until a permanent legal and institutional framework is in place" (NBI, 2000) and comprises a Council of Ministers of Water Affairs of the Nile Basin (Nile-COM), a Technical Advisory Committee (Nile-TAC) and a Secretariat (Nile-SEC), the latter located in Entebbe.[15]

Focusing on a process-oriented approach, the NBI firstly sought to establish a common point of departure for all stakeholders, namely the NBI "Vision." This aimed at framing the tasks to be institutionalized within subsidiary action programs (SAP) at a sub-basin level. These SAPs aimed to "identify and implement investment projects that confer mutual benefits at the sub-basin level and that the riparians agree to pursue cooperative [activities]" (NBI, 2000).

The "visioning process" took six months to complete, and the wording of it required major revision, discussion, and fine-tuning. Nevertheless, the importance of establishing the "vision" lay as much in the process undertaken as in the end result, and by bringing together all the co-riparians (except for Eritrea which, at the time, remained an observer) raised important discussion on key legal and development issues.

The success to date of the NBI lies in one of its institutional innovations, namely the application of the principle of subsidiarity, or management of the basin at the lowest appropriate level.[16] This has led to institutional division into an "eastern Nile" comprising Ethiopia, Sudan, and Egypt (and Eritrea too, were it to formalize its participation), and the Nile "equatorial lakes" countries (comprising Kenya, Uganda, Tanzania, the DRC, Rwanda, and Burundi as well as Egypt and Sudan). The inclusion of the latter two represents recognition of the importance of the White Nile to both countries. The basic rationale is that in reducing decision-making complexity the process of cooperation can be facilitated.

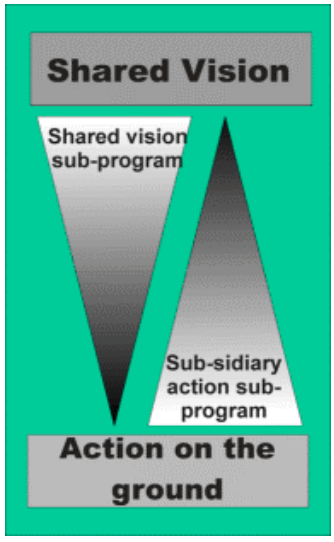

Figure 8.

Under this principle, the NBI established two Subsidiary Action Plans (see Appendices), much of which emerged out of the earlier NRBAP project. The Eastern Nile program and the Nile Equatorial Lakes program aimed to express the vision in terms of actions on the ground, bringing high level political engagement and agreement to socioeconomic development within the states themselves.[17] In tandem with these action programs, a shared vision program would help to continue to support the process of cooperation, included within which were a number of cross cutting projects:

- Nile Basin Transboundary Action
- Regional Power Trade
- Efficient Use for Agricultural Production
- Water Resources Planning and Management
- Applied Training
- Confidence-Building and Stakeholder Involvement
- Socioeconomic Development and Benefit Sharing (see appendices).

This program was envisaged to "create an enabling environment for cooperative management and development … through a limited but effective set of basin-wide activities and projects" (NBI, 2001).

Since 2001 the major preoccupation of the process has been the establishment of sound funding for this portfolio of projects and programs. To this end, the International Consortium on the Cooperative Development of the Nile (ICCON) was created and held its first meeting in Geneva (ICCON 1) in June 2001, at which it received pledges from donors of US$120 million over a six to eight-year time frame. ICCON's long-term aim as a partnership of riparian states and the international community is to promote joint funding, transparency, and more broadly to raise support for the NBI. One of the key process issues is the establishment of a multi-donor Nile Basin Trust Fund to provide "streamlined, cost-effective funding … which would consolidate donor support and ensure the clarity and cohesiveness of the program" (NBI, 2000). Following Parliamentary approval of the NBI's new international organization status under Ugandan law in September 2002, it was envisaged that the NTF would shortly come under the management of the Nile Basin Secretariat.

In total, the cost of financing the NBI is estimated to be in the order of US$140 million for the Shared Vision Program project implementation, US$30 million for the Subsidiary Action Program project preparation and general NBI facilitation, and program management – crucially, including riparian dialogue as well as program oversight – some US$10 million.

The NBI in 2003 – appropriately the International Year of Freshwater – is now at the stage of moving from the development of cooperation and the institutionalization of this process to the achievement of development through joint multilateral and bilateral projects. This is a crucial test for the whole initiative and the principles on which it is built. The credibility of the external facilitation process is also at stake. Proof of success will not, in the long term, reside in cooperative frameworks or even the absence of major international conflict; rather it will lie in the capacity of processes and institutions to translate cooperation into development, and development that achieves poverty reduction from the local level upwards.

One of the major challenges to ensuring the sustainability of the NBI is in creating a process of institutional support at all levels, including civil society at regional, national, and local levels. The importance of this challenge has been emphasized within the Nile Basin Discourse Project (undertaken since 2001) that attempts to facilitate dialogue about the NBI and to establish learning processes for institutions involved in Nile Basin-related activities be they environmental,

socioeconomic, or cultural. In 2003 a formal Nile Basin Discourse Desk was established in Entebbe.

5. LESSONS AND CAUTIONS

5.1. Cooperation is Not Necessarily Development

Some of the early external facilitation of Nile Basin cooperation by the World Bank focused on issues including the need to "level the playing field" through building national capacity and identifying national priorities, as well as correcting what it saw as "information asymmetry." A second focus was to move from dialog to actions, within which there was a need to develop dialog on different tracks (for instance, information, capacity, technology) as well as to "start with the achievable and avoid getting bogged down in formulae." This also sought to recognize that "progress on complex water systems may be slow, but dialog needs to be sustained and trust needs to be established." Finally there was the aim to "seek opportunities for mutually beneficial programs or projects." This latter concept of the "win–win" has come to dominate much of the thinking on the NBI, particularly in terms of win–wins in benefit sharing (Hirji and Grey, 1997).

The premise of much of the NBI cooperative framework is that win–wins are achievable, and demonstrably so, through integrated project development. This involves the creation of cooperative frameworks that enable links between cooperation and development to be made, not just in terms of joint funding, management, and the development of projects – the easy part of cooperation – but in terms of joint benefit sharing from such projects. This is a complicated achievement to monitor, and yet in the end the establishment of "equity" as the basis for an operational framework within the Nile Basin demands success in delivering tangible and shared development *benefits* at all levels, and not simply cooperative frameworks and joint management of institutions.

The tables in the appendices that detail the NBI's major programs illustrate the nature and level of the national and basin-wide institutional and process complexity within the basin. At a national level the process will become particularly convoluted, with at least seven or eight NBI-related (or discourse-related) institutional structures at least nominally being established in each state. This will add increased pressure – but admittedly bring in more resources – to existing national-level institutions, from water ministries and departments, to environmental, agricultural, and finance ministries and departments. As far as possible this needs to be mainstreamed within existing processes in order to avoid the problem of duplication, overloading of processes and institutions, and perhaps increased rent-seeking behavior. Such questions are really at the heart of the challenge of shifting from the cooperative to the developmental framework. Avoiding conflict is not that difficult because, arguably, conflict over water was never really a major issue. However, taking the positive step to build development processes into greater cooperation similarly challenges the basin states, because formerly there has not been a great level of regional integration in social, political, and institutional development. To that extent the NBI can help to establish a basis for wider socio-political objectives as well.

5.2. Development is Not (Necessarily) Poverty Reduction

In this shift from cooperation to development, there needs to be more than just commitment to national development. Qualitatively speaking, it has to address the question of economic and social equity and the inter- and intra-national levels. Even developments generated within the basin – perhaps trade in power or better environmental management – do not necessarily enable poverty reduction. And yet

this has to become the major focus of all efforts at taking the initiative forwards. Therefore, in the coming years cooperation needs to be grounded in wider development concepts. As an example, whilst one of the key ENSAP projects on Watershed Management is addressing an issue of major concern to highland farming in Ethiopia, its success will in large part depend on its capacity to integrate learning generated elsewhere within the project, including earlier examples of watershed management undertaken in other regions of Ethiopia. It may be easier to reach cooperation on development options between states than it is to get local-level agreement within states. As a general rule this is likely to apply to a whole range of major infrastructure projects on the river identified under the NBI.

Success of the NBI will, in large part, rest on being able to meet this challenge. NBI development projects need to be mainstreamed within regional, national, and local development processes, and not simply exist in parallel, labeled as "water resource-" or "river basin-" focused. This urgent challenge has yet to become effectively internalized within the process.

The Nile Basin is at a key juncture in its history. There is a major need to maintain the integrity of the river system itself in the face of rapidly rising demand, while at the same time demonstrate how the river can be utilized more productively and equitably. If the NBI is to work it also needs to be able to demonstrate early success. This will also help in the spill-over effect on a range of development issues, including increasing the social and economic stability that is essential to helping to achieve political stability in conflict-prone regions.

As an end in itself the NBI does not go far enough: cooperative processes need to be geared to specific goals of development, and poverty reduction related to wider socioeconomic development. But it has traveled a long way to date. A reassessment of direction and impact may soon be required, in order to steer the process from successful cooperation to successful development.

NOTES

1. See, for example, *Financial Times,* A Source of Future Conflict on the Nile (April 21 1993); *Guardian*, Nile Plans Create Stormy Waters (November 9 1998).
2. BBC News Online, Russell Smith. Africa's Potential Water Wars (November 15 1999).
3. Agriculture commonly accounts for up to 70 percent of water use in many states.
4. See Professor Tony Allan's thesis on "Virtual Water" (Allan, 2001) with respect to the Middle East and North Africa. This holds that imported food commodities include a quantity of "virtual water," being the water used in producing the food at its place of production. For instance, a rough estimate for 1,000 tonnes of wheat would be the equivalent of 1,000 cubic meters of water.
5. Egypt, Sudan, Ethiopia, Eritrea, Kenya, Uganda, Tanzania, Rwanda, Burundi, Democratic Republic of Congo.
6. Currently the continent contains eighty international river and lake basins, twenty-one of which have catchment areas greater than 100,000 sq km, and five of which (Volta, Zambezi, Niger, Zaire, and Nile) are shared by six or more states (Hirji and Grey, 1997).
7. Portuguese explorers such as Father Pedro Paez claimed to have found the source of the Blue Nile in 1618; James Bruce reached the source in 1770; from 1857–9 Burton and Speke explored the Equatorial Lakes Plateau and in 1963 Speke declared that he had discovered the source of the White Nile; in that year Samuel Baker traversed the Sudd swamp in southern Sudan; by 1877 the full Nile course had been traced from Lake Victoria to Khartoum.
8. The rise of the Sudan People's Liberation Movement in south Sudan, the Eritrean People's Liberation Front and the Tigrayan People's Liberation Front are good examples of such groups.
9. Including the fact that Egypt had been invaded only three years previously by Great Britain, France, and Israel during the Suez crisis.

10. In a memo that the Ethiopian government circulated in response to the NWA it stated that:

    > Ethiopia the sole source of nearly the entirety of the waters involved, must, once again, make it clear that the quantities of the waters available to others must always depend on the ever increasing extent to which Ethiopia, the original owner, is and will be required to utilize the same for the needs of her expanding population and economy.
    >
    > (Whiteman, M. M. 1994. *Digest of International Law*, Vol. 3, Washington, D.C., p. 1012)

11. Undugu ('brotherhood' in Swahili) was formed under OAU auspices in 1983 and was vigorously backed by Boutros-Boutros Ghali. It served largely to promote Egyptian interests within the equatorial lakes region.
12. Transitional Government of Ethiopia. 1994. Framework for Cooperation between the Nile River co-basin States: Country Paper—Ethiopia. Paper presented to the Nile 2002 Conference on Comprehensive Water Resources Development of the Nile Basin: The Vision Ahead, January 29 to February 1, Khartoum, Sudan.
13. Minutes of the fifth regular meeting of the Technical Advisory Committee (ESTAC) on Nile Water Resources Cooperation, April 13–21 1995, Khartoum).
14. Agreed Minutes of the Second Meeting of Ministers of Water Affairs of the Nile Basin Countries on Tecconile, January 18–24 1994.
15. The Council of Ministers of the Nile Basin established a Nile Technical Advisory Committee (eighteen members) made up of a single representative for each country and one alternate. The NileTAC is basically charged with coordinating NileCOM work, and establishing and overseeing the work of the Nile Basin Secretariat.
16. This was an idea put forward at an early stage by the Ethiopian government in their presentation to the Second Nile 2002 conference in Khartoum, 1994.
17. See project details in appendices.

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Appendix 1: Key Characteristics

Table A1.

Country	Total area	% area in basin	% of basin area	Internal renewable water resources –from endogenous precipitation	Actual annual renewable water resources, including transboundary	Dependency ration %
Sudan	2 505 810	79	64	35	88.5	77.3
Ethiopia	1 100 100	33	12	110	110	0
Egypt	1 001 450	33	10	1.8	58.3	96.9
Uganda	235 880	99	7	39.2	66	40.9
Tanzania	945 090	9	3	80	89	10.1
Rwanda	26 340	75	1	6.3	6.3	0
Eritrea	121 890	20	1	2.8	8.8	68.2
DRC	2 344 860	1	1	935	1,019	8.2
Kenya	580 370	8	1	20.2	30.2	33.1
Burundi	27 834	48	< 1	3.6	3.6	0
Total	8 889 534					

(Sources: FAO, 1995; Bricheri-Colombi, 1997)

Appendix 2: Major NBI Sub-programs

Table A2. Shared Vision Projects Overview Table

Type	*Function*	*Project*	*Objectives*	*Indicative cost ($US million)*
Sectoral	Technical foundation for regional cooperation: 1. Common analytical framework 2. Practical tools and demonstrations 3. Capacity-building	1. Nile transboundary environmental action	Provide a framework for basin-wide environmental action linked to transboundary issues in the context of the Nile Basin Initiative Strategic Action program.	**39**
		2. Nile Basin regional power trade	Establish the institutional means to coordinate the development of regional power markets.	**12**
		3. Efficient use of water for agriculture	Provide a conceptual basis to increase water availability and efficient water use for agricultural production.	**5**
		4. Water resources planning and management	Enhance the analytical capacity for basin-wide perspective to support the development, management and protection of Nile Basin Waters.	**28**
Cross cutting	Provide a common vision and ensure long-term sustainability	5. Confidence building and stakeholder involvement (communications)	Encourage greater basin-wide political engagement; raise public awareness; strengthen public confidence and trust; bolster stakeholder involvement and participation; and promote discourse on regional development.	**7**
		6. Applied Training	Strengthen institutional capacity in selected subject areas of water resources planning and management in public and private sectors and community groups; create or strengthen centers with capacity to develop and deliver programs on a continuing basis.	**20**
		7. Socioeconomic development and benefit sharing	Strengthen Nile River basin-wide socioeconomic cooperation and integration through: a) joint identification, analysis, and design of co-operative development options and priorities; b) development of criteria, methods and frameworks for sharing benefits/costs, and managing attendant risks	**11**
Total				**$122**

Table A3. Subsidiary action program projects

ENSAP projects (Integrated Development of the Eastern Nile)	NELSAP projects
Eastern Nile Planning Model sub-project	Enhanced Agricultural Productivity through Rainwater harvesting, small-scale irrigation and livestock management Fisheries project for Lake Albert and Lake Edward
Baro-Akobo Multi-purpose Water Resources Development Sub-project	Development of a framework for cooperative management of the water resources of the Mara River Basin Kagera river basin integrated water resources management
Flood preparedness and Early Warning Sub-project	Development of a framework for cooperative management of the water resources of the Malakisi-Malaba-Sio River Basins Water Hyacinth Abatement in the Kagera River Basin
Ethiopia-Sudan Transmission Interconnection Sub-project	Rusumo Falls Hydro-power Development
	Ranking and feasibility study of HEPs in the NEL region
Eastern Nile Power Trade Investment Program	Interconnection between Kenya and Uganda
Irrigation and Drainage sub-project	Interconnection between Burundi, DRC and Rwanda
Watershed management sub-project	Interconnection between Burundi and Rwanda Interconnection between Rwanda and Uganda

(Source: NBI, 2001)

Table A4. Summary of Nile Basin Initiative Estimated Financing Needs

Program	Item	Indicate Amount ($US million)
Shared vision program (SVP)	1. Nile Basin Transboundary Environmental Action	39
	2. Nile Basin regional power trade	12
	3. Efficient Water use for agricultural production	5
	4. Water resources planning and management	28
	5. Confidence-building and stakeholder involvement	7
	6. Applied training	20
	7. Socioeconomic development and benefit sharing	11
	Total SVP	**122**
Subsidiary Action Programs	NELSAP	30
	ENSAP	49
	Total SAP	**79**
NBI facilitation and program management	1. Ongoing support to facilitate NBI progress and development	10
	2. SVP program coordination, quality assurance and monitoring	
	Total NBI facilitation and management	**10**
	Total Financing	**211**

(Source: NBI, 2001)

Index entries: River Nile, cooperation, water management, riparian countries, sustainable development, Nile Basin Initiative, poverty reduction, basin management, dispute resolution, Nile, politics, development, Horn of Africa

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Constitution of UNESCO (excerpt)

London, 16 November 1945

The Governments of the States Parties to this Constitution on behalf of their peoples declare:

That since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed;

That ignorance of each other's ways and lives has been a common cause, throughout the history of mankind, of that suspicion and mistrust between the peoples of the world through which their differences have all too often broken into war;

That the great and terrible war which has now ended was a war made possible by the denial of the democratic principles of the dignity, equality and mutual respect of men, and by the propagation, in their place, through ignorance and prejudice, of the doctrine of the inequality of men and races;

That the wide diffusion of culture, and the education of humanity for justice and liberty and peace are indispensable to the dignity of man and constitute a sacred duty which all the nations must fulfil in a spirit of mutual assistance and concern;

That a peace based exclusively upon the political and economic arrangements of governments would not be a peace which could secure the unanimous, lasting and sincere support of the peoples of the world, and that the peace must therefore be founded, if it is not to fail, upon the intellectual and moral solidarity of mankind…

International Hydrological Programme

World Water Assessment Programme