

# Visions of Nile basin development

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## Abstract

This paper describes five alternative visions for cooperative Nile development in the hope that they will assist the Nile riparian countries in their search for both a consensus vision and sound development projects. These five alternate visions [(1) *Century Storage Plus*, (2) *Water for Peace*, (3) *Southern Lights*, (4) *The Green Nile*, and (5) *Economic Partners on the Nile*] are intentionally stylized to make them easy to understand and remember. There is a common thread tying all five of these alternative visions together: the desire of all riparian countries for peace and economic development. Each of the five visions describes a peaceful future in which its proponents believe economic prosperity will flourish. One of the advantages of thinking explicitly about these alternative visions is that comparisons can reveal surprising compromises – or coalitions – that may become possible between Nile riparian countries even though some members of the political leadership in the riparian countries may still hold quite different ideas about the way to achieve cooperative development.

*Keywords:* Economics of cooperation; Integrated water resources development; International waters; Nile River; River basin development; Scenario analysis

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## 1. Introduction

The countries in the Nile basin are now engaged in serious dialogue on the future development of their shared water resources. As a long-time observer of the hydro-politics of the Nile, I have been heartened by the progress over the past five years. The increased communications and openness among the riparian countries seems quite simply to be of historic proportions. Never before have these countries held such discussions on cooperative development possibilities for the Nile waters. This process, termed the “Nile Basin Initiative” and facilitated by the World Bank and other donors, has created an atmosphere of great hope and optimism where only a few years ago many analysts, including myself, saw only the seeds of future conflict.

This new climate of openness and dialogue has begun a process that it is hoped will result in both (1) a consensus vision of how peaceful, socio-economic development can proceed in the Nile basin and

(2) concrete plans for implementation of cooperative/joint management and investments. Indeed, in June 2001 the Nile riparian countries presented their Shared Vision Program and the basic outlines of two sub-basin investment programs to international donors at the International Consultation on the Nile (ICON) meetings in Geneva. In the past the search for a unifying vision of what cooperative development of the water resources of the Nile basin actually means has proven elusive for the Nile basin riparian countries (see Figure 1 for a map of the Nile basin and the location of the ten Nile riparian countries: Egypt, Sudan, Ethiopia, Eritrea, Uganda, Kenya, Tanzania, Congo, Rwanda and Burundi). Nile riparian countries spoke of “win-win opportunities” and “sharing the benefits of cooperative development, not water”, but behind these constructive but broad generalizations lay several alternative visions of river basin development. The challenge facing the participants in the Nile Basin Initiative is now to find the common ground between different visions of Nile development and to craft a new consensus vision that retains the best elements of each. In this essay I describe these alternative visions of Nile development in the hope that it will assist the Nile riparian countries in their search for both a consensus vision and sound development projects. No recommendations are offered about what this new shared Nile vision or cooperative development plan should be. Rather I emphasize (1) that there have been in fact quite different ideas afloat about what cooperative development means, and (2) that these competing visions have concrete implications for what infrastructure projects should be built and when.

The analysis begins in the next, second section with a brief review of H.E. Hurst, R.P. Black and Y.M. Simaika’s Century Storage Scheme, the first comprehensive vision of integrated water resources development for the Nile basin and proceeds to a summary of the main structural alternatives that have been proposed for the development of the upstream portion of the basin. Different pieces of the infrastructure puzzle can be assembled (and operated) in different ways depending on the values and objectives of those involved.

The third section presents a discussion of what I believe is the essential nature of the water resources planning problem in the Nile basin as it has been conceptualized over the past decades. The fourth section is the heart of this essay, a description (in general terms) of five strategic visions, or directions, for cooperative Nile development. As presented, these alternative visions are intentionally stylized, to make them easy to understand and remember. Yet they are not mutually exclusive. Development plans can be envisaged that would accomplish objectives implicit in two or more alternative visions. Nevertheless, at this stage of the planning dialogue, it seems valuable to clarify the past differences in competing visions; the Nile riparian countries themselves are now attempting to synthesize these alternative visions into a single consensus vision of cooperative development. This will involve hard practical choices and there is much at stake. In the fifth section some of the tradeoffs are illustrated by considering each of these five visions from the perspective of one or another riparian country. The final section offers some concluding remarks.

## **2. Background: the Century Storage Scheme and the Blue Nile Reservoirs**

During the late 19th century and the first decades of the 20th century, various ideas for water development infrastructure on the Nile were widely discussed and debated in Egypt and the international engineering community. In 1946 H.E. Hurst, R.P. Black and Y.M. Simaika of the Egyptian Ministry of Public Works (Hurst *et al.*, 1946) assembled the main project proposals into a blueprint for basin-wide development of the Nile, which they termed the Century Storage Scheme. This was published as *The*

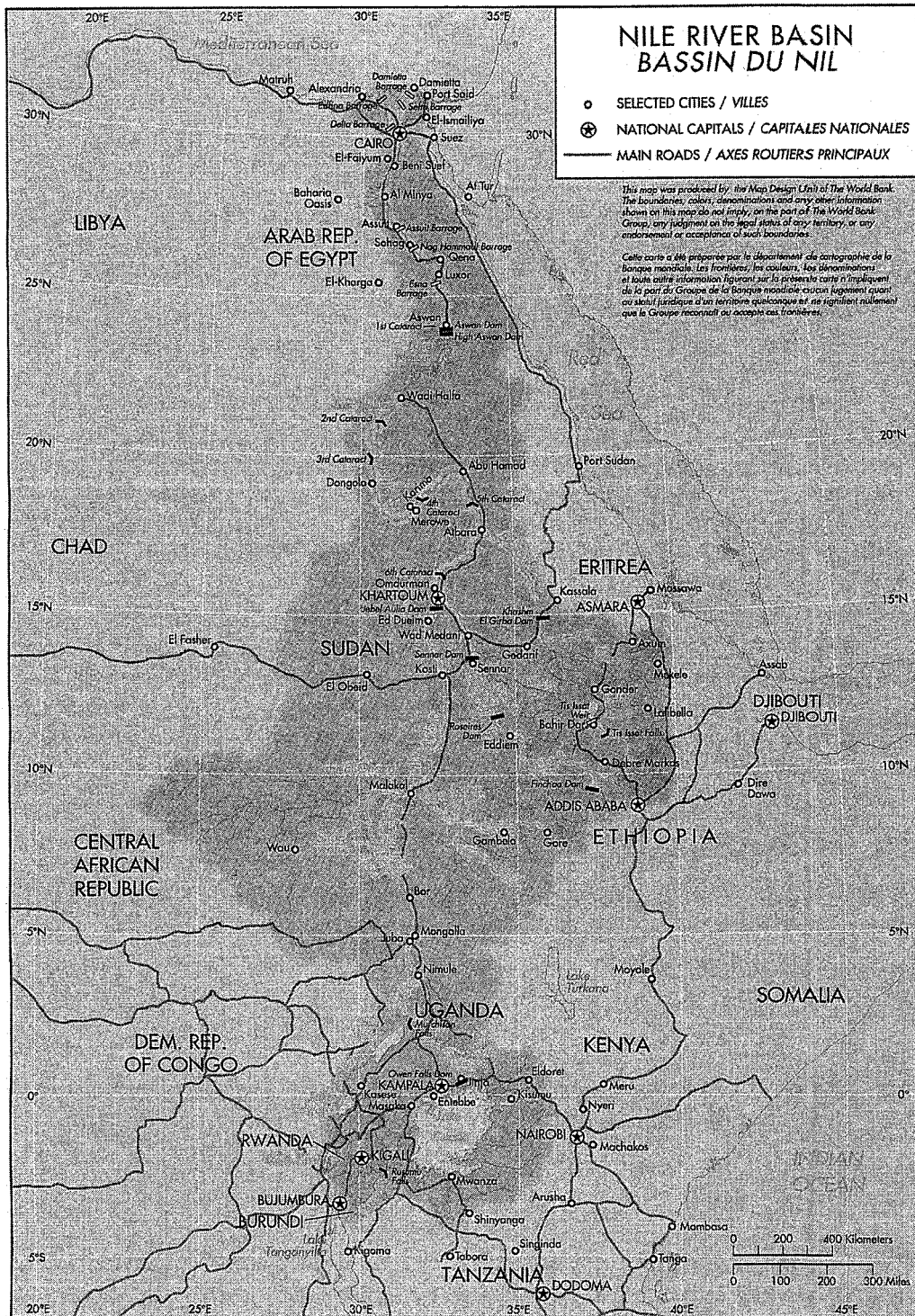


Fig. 1. The Nile basin.

*Future Conservation of the Nile*, volume 7 of their multi-volume work *The Nile Basin*, which provided hydrological data and analysis to support the plan. The Century Storage Scheme has strongly influenced subsequent conceptions of what cooperative development of the Nile basin might entail.

Two fundamental assumptions under-girded the Century Storage Scheme. The first was that Egypt needed an increasing and controlled supply of Nile water for expanding irrigation, both to meet the food requirements of an increasing population and to cultivate more cotton, its main export crop. The second was that the major portion of the system-wide reservoir capacity required to store water from years of high floods to years of low floods was only possible in the Equatorial Lakes in the White Nile sub-basin. Hurst, Black and Simaika argued for storage in the Equatorial Lakes region because evaporation losses there would be counterbalanced by the high rainfall and reservoir silting would not be as major a problem as it was on the Blue or Main Niles. *The Future Conservation of the Nile* appeared several years before Adrien Daninos, a Greek engineer, proposed (in 1952) a new, larger dam at Aswan and at the time there did not seem to be any serious alternatives to Hurst, Black and Simaika's proposal for over-year storage in the Equatorial Lakes region.<sup>1</sup>

The Century Storage Scheme consisted of four main new projects (Figure 2):

- (1) an over-year storage reservoir at Lake Albert in Uganda (combined with water regulation on Lake Victoria);
- (2) a diversion canal designed to carry water around the Sudd swamps in Sudan (termed the "Jonglei Canal");
- (3) over-year storage in Lake Tana at the source of the Blue Nile in Ethiopia;
- (4) an additional seasonal storage reservoir on the Main Nile in the region between the Atbara River and Wadi Halfa.

The linchpin of the Century Storage Plan was the large dam at the outlet of Lake Albert. Hurst estimated that the initial storage capacity of the resulting reservoir would be about 100 billion to 125 billion cubic meters (where 1 billion = 1000 million) and that this could be increased to 155 billion cubic meters as Egypt's water needs increased<sup>2</sup>.

The projects of the Century Storage Scheme did not tackle head-on the main problem faced by the Nile planners: the extreme variability of the Blue Nile flows. The storage planned at Lake Tana could not be used to hold back Blue Nile floodwaters, which largely entered the Blue Nile from tributaries downstream of Lake Tana. The over-year storage planned for Lake Tana in the Century Storage Scheme was envisaged as a supplement to the main over-year storage at Lake Albert. The plan required careful coordination of control structures on the White and Blue Niles. The basic idea was that the tail of the Blue Nile flood would be captured by the then-existing low Aswan Dam (built in 1902 and raised in 1912 and again in 1933). Storage in Lake Albert would be used to supplement the low summer flows in the Main Nile after the majority of the Blue Nile floodwaters had flowed into the Mediterranean.

Today, none of these four main infrastructure components of the Century Storage Scheme has yet been built. A modified Jonglei Canal project begun in 1978 was three-quarters complete when construction halted in 1983 owing to escalating conflicts in the Sudanese civil war. Egypt and Sudan have been waiting

<sup>1</sup> Daninos' proposed dam came to be known as the "Aswan High Dam". Construction began in 1960 and was completed in 1970.

<sup>2</sup> This higher figure approximates the capacity of the Aswan High Dam Reservoir.

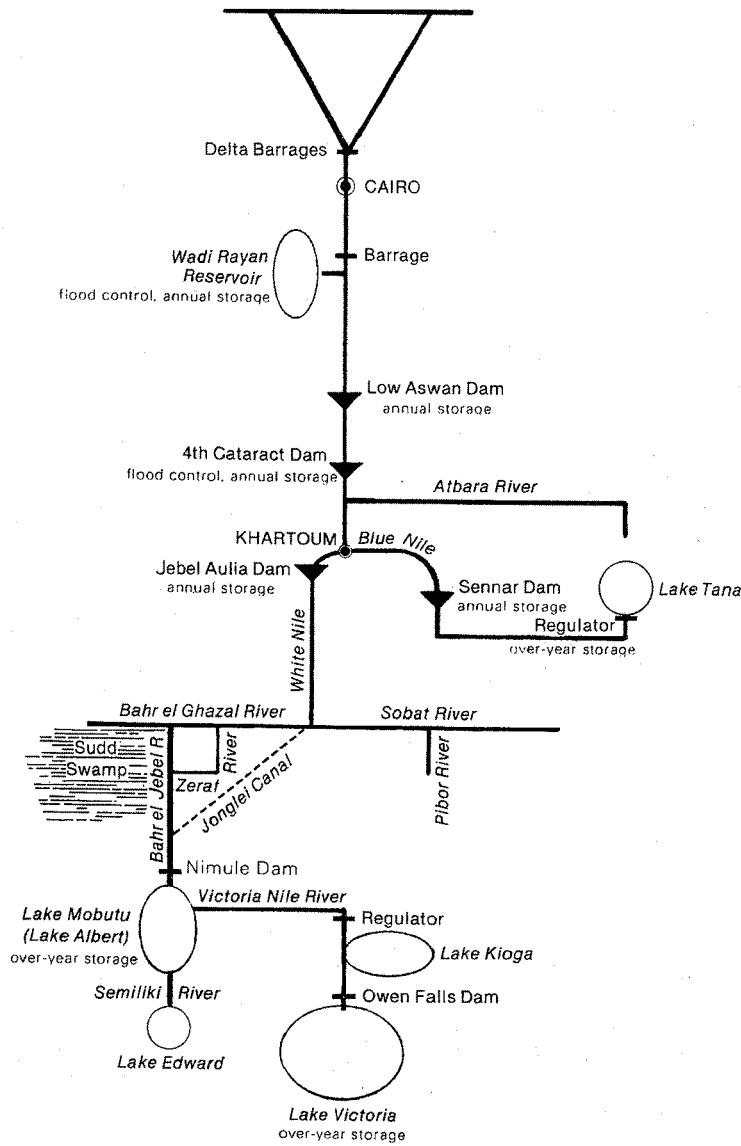


Fig. 2. The Century Storage Scheme.

stoically to finish that project, which is expected to increase downstream flows by about 3 billion cubic meters (measured at Aswan). If Egypt and Sudan were to decide in the future to finish the Jonglei Canal, this would not be easy because the enormous piece of equipment used for the excavation of the canal is almost certainly useless now, after 18 years sitting idle and rusting in southern Sudan.

The three main Nile riparian countries on whose territories the projects of the Century Storage Scheme would have been built (Ethiopia, Sudan and Uganda) had somewhat different reactions to the plan. Ethiopia rejected it out of hand (as well as all other Nile projects that were based on the assumption that the Blue Nile flows would be used solely for the benefit of Egypt and Sudan). From the end of

World War II Ethiopia continually asserted, at international forums of various kinds, its right to use the waters of the Blue Nile for the benefit of its people. In February 1956, for example, reacting to the plans for the Aswan High Dam, the Ethiopian Ministry of Foreign Affairs issued a communiqué which asserted that Ethiopia had the right to use the waters of the Nile for its own development and that it would not be bound by any agreement between Egypt and Sudan.<sup>3</sup>

Sudan, still under British colonial control at the time, took a more moderate position. Although less than enthusiastic about the diversion canal around the Sudd swamps that was proposed in the Century Storage Scheme, the Government of Sudan created a multi-disciplinary Jonglei Investigation Team (1953) to study the impacts of the project on the inhabitants of the region – which had received little attention in *The Future Conservation of the Nile*. After several years of serious study and fieldwork, the team (1) concluded that the Jonglei Canal would in fact have serious adverse effects on the people and ecology of the Sudd region and (2) proposed a modified project designed to mitigate those envisioned damages.

As late as 1966, Hurst continued to reject the Jonglei team's conclusion that the indigenous people of the Sudd region had a right to maintain their pastoral way of life, arguing that this position "gravely jeopardized any project for conservation of the waters of the Bahr el Ghazal region, which project has always been foreseen as the logical extension to the Upper Nile Projects when Lake Victoria and Albert have been brought under control." With hindsight it is easy to see that what to Hurst was "water conservation" was to the inhabitants of the Sudd swamps the loss of their perceived water rights (Hurst *et al.*, 1966).

Uganda, also a British colony at the time, was more accommodating to Egypt than Sudan. Shortly after World War II discussions began between Egypt and Uganda on a regulation structure envisaged in the Century Storage Scheme, 3 km north of the outlet of Lake Victoria at Owen Falls. Construction of the Owen Falls Dam began in early 1950 and was completed in 1954. Uganda's ready cooperation was due in large part to its being the beneficiary of new hydroelectric power generation facilities installed at Owen Falls. Egypt contributed the construction costs and compensated Uganda for damages incurred upon residents alongside the shores of Lake Victoria whose lands were flooded by the increased water levels. But Egypt could not effectively utilize the increased storage in Lake Victoria until the Jonglei Canal was completed.

Although the Aswan High Dam ultimately replaced the proposed Lake Albert Reservoir as the main site in the Nile basin for over-year storage for Egypt, the Century Storage Scheme remains today the only explicit basin-wide plan for the development of the Nile. As such, although the main pieces of the Century Storage Scheme have never been built, it still exerts a powerful influence on the collective consciousness of Nile development planners.

Since the publication of *The Future Conservation of the Nile*, there has appeared only one other major work on river basin planning that has also commanded the attention of students of Nile control: the US Bureau of Reclamation's integrated hydroelectric and irrigation plans for the Blue Nile in Ethiopia. In June 1954 the Ethiopian Emperor, Haile Salassie, accompanied by his youngest son and granddaughter,

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<sup>3</sup> This communiqué read in part: "As in the case of all other natural resources on her territory, the utilization by Ethiopia of her resources in water will be effected strictly in accordance with the present and projected needs of her expanding population and economy determined by scientific studies undertaken and constantly pursued by the Imperial Ethiopian Government. Following the satisfaction of her national requirement, Ethiopia will count it a privilege to be able to contribute through her natural resources and measures for the conservation of the same, to the welfare of the inhabitants of neighboring sister nations on the banks of the Nile".

visited the Grand Coulee Dam (which at the time was the world's largest hydroelectric power plant) on the Columbia River in the Western United States. The emperor indicated that he was greatly impressed with this and other large dams in the Pacific Northwest and he expressed the hope that similar projects might be built on the Blue Nile in his own country. He added that planning for such projects in Ethiopia was well under way.<sup>4</sup>

From 1958 to 1963 this planning proceeded in collaboration with the US Bureau of Reclamation, the agency responsible for water resources development and the large dams constructed in the western United States. The Ethiopian Ministry of Public Works and Communications and the US Bureau of Reclamation studied the potential for hydroelectric power generation and irrigation in the Ethiopian portion of the Blue Nile basin; the bureau published the results in a multi-volume report in 1964 (US Bureau of Reclamation, 1964). The investment program recommended in the report included irrigation projects totaling 484,000 hectares (approximately 17% of the irrigated area in Egypt) with an annual water requirement of 6 billion cubic meters. The investment program also proposed four large dams in the Blue Nile gorge downstream of Lake Tana: Karadobi, Mabil, Mendaia and the Border Project (on the boundary between Sudan and Ethiopia). These four dams, with a projected initial active storage capacity of about 51 billion cubic meters, would have a dramatic effect on the flow of the river in Ethiopia, being sufficiently large essentially to eliminate the Blue Nile flood (Guariso & Whittington, 1987). The report estimated annual hydroelectric production from these four dams at more than 25 billion kilowatt hours (roughly three times the average annual production of the Aswan High Dam).

The US Bureau of Reclamation's study focused only on Ethiopia, but it fundamentally challenged one of the main assumptions underlying the Century Storage Scheme. The report argued not only that storage reservoirs on the Blue Nile were technologically feasible and in no danger of silting up, but that they were extremely attractive investments from an economic point of view, largely because of their huge hydroelectric power potential. The bureau's calculations showed that all four of the large dams proposed for the Blue Nile would have benefit–cost ratios greater than three from projected hydropower generation alone – that is not counting additional benefits from flood and silting control and expanded irrigation.

In 1963, just as the US Bureau of Reclamation's report was being finalized, Haile Salassie returned to the United States for a state visit to confer with President John F. Kennedy on a variety of strategic matters dealing with the end of colonial rule in Africa and the threat of communist infiltration. Kennedy pledged continuing interest in "Ethiopia's economic development and security", and their communiqué indicated that members of the Ethiopia delegation had urged the United States to help Ethiopia with the development of the country's rivers.<sup>5</sup>

### **3. An overview of the water resources planning problem in the Nile basin**

For millennia architects of Nile control have faced two principal water management challenges: how to change the intra-year allocation of Nile water and how to change the inter-year variation in Nile flows. Although the Nile south of Aswan remains one of the least developed of the major international rivers

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<sup>4</sup> Evidently the emperor was well aware of the strategic implications of such dams on the Blue Nile, for his Minister of Defense, General Abeye Abbebe, also accompanied him on the trip.

<sup>5</sup> *New York Times*, 1963, 16 October, 16.

of the world, it is now relatively easy to see how these two problems could in principle be solved. A series of multipurpose dams on the Blue Nile in Ethiopia, perhaps similar to those recommended by the US Bureau of Reclamation, could completely control the Blue Nile flood and enable water resources managers to eliminate both the inter-year and intra-year variation in the flow of the Blue Nile.

On the White Nile over-year storage in the Equatorial Lakes (Victoria, Kyoga and Albert), as envisaged in the Century Storage Plan, perhaps with smaller control structures on the tributaries feeding Lake Victoria, could provide hydropower generation and a controlled water supply for riparian countries around Lake Victoria and on the White Nile. If the Jonglei Canal were finished, it would also become possible to provide increased water supplies for Sudan and Egypt and to coordinate the operation of reservoirs on the White and Blue Niles better. From a hydrological standpoint there are numerous configurations of these control structures that could essentially provide water resource managers with the ability to deliver the available Nile waters when and where they desired.

Depending on one's point of view, the present limited number of major control structures on the river south of the Aswan High Dam is either (1) an opportunity for water resources investments that will spur the economic development of the region or (2) a blessing in that large dams have not yet wrought environmental havoc throughout the entire basin. From the perspective of water resources professionals and policymakers in the Nile basin countries, it can only be described as richly ironic that just as they are on the verge of reaching consensus on at least some cooperative infrastructure investments, the global community is becoming increasingly reluctant to countenance the construction of large dams<sup>6</sup>. But despite reservations among global environmental and development experts about the wisdom of dam projects, powerful driving forces at work in the Nile basin will certainly create great pressure to build at least some additional control structures.

First among these forces are demands for increased water supplies owing to rising population and economic growth. As shown in Figures 3 and 4, populations in the countries of the Nile basin are growing rapidly: the total population of the riparian countries is currently about 270 million; by 2050 it is forecast to reach 750 million. Today Egypt's population is about 65 million; by 2050 it is projected to reach 110 million. Ethiopia's current population is also about 65 million, but by 2050 it may far surpass Egypt's, increasing to about 220 million. Rising populations require more food supplies and this typically means more irrigated agriculture as well as increased food imports.

Not only is population growing, but so also may per capita GNP (Figures 5 and 6). Economic growth leads to increased water use in both residential and industrial sectors, as well as in agriculture. Long-term economic forecasts are even more uncertain than population projections, but over the past three decades the trend in Egypt has clearly been upward. Throughout the rest of the region, the direction of economic growth has been much more mixed, but recently Ethiopia and Uganda have made considerable economic progress.

At the same time that economic and population growth in the Nile basin are pointing towards the need for increased water use, regional climate models of global warming suggest that the available water supplies in the Nile basin may well decrease. The latest consensus projections from the International Panel on Climate Change (IPCC) on the effect of global warming on regional precipitation point to significant reductions in rainfall over much of the Nile basin (IPCC, 2000). But even without adverse

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<sup>6</sup> For example, in November 2000 the World Commission on Dams published its long-awaited report on the costs and benefits of dam construction, which came out on the side of critics of dam projects. The commission concluded that the negative side effects of dams were more wide-ranging and serious than commonly recognized.



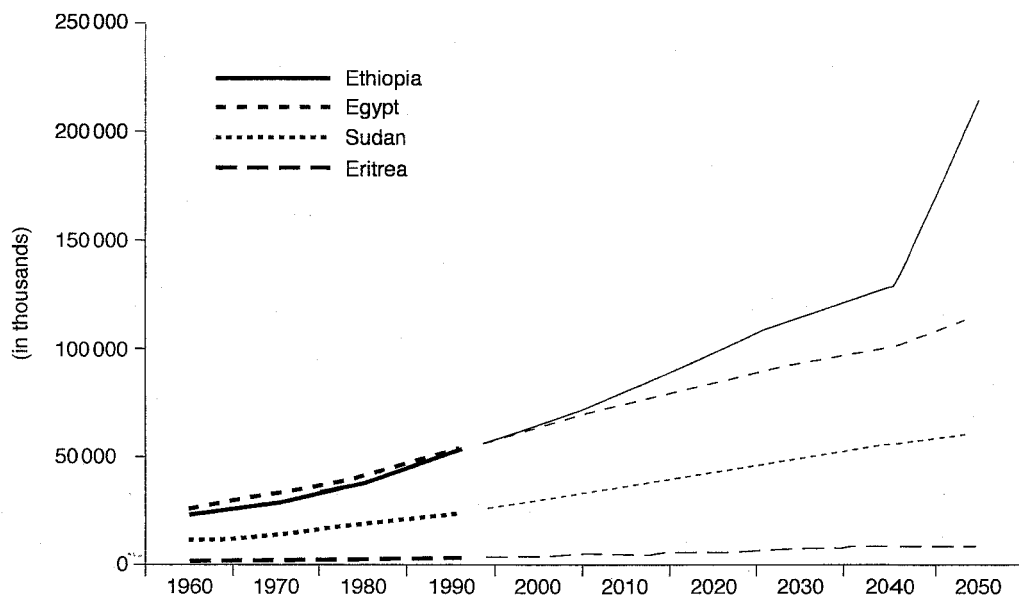


Fig. 3. Population projections (growth and forecast) for countries in the Blue Nile basin to 2050. Source: 2000 World Development Indicators CD-ROM, World Bank.

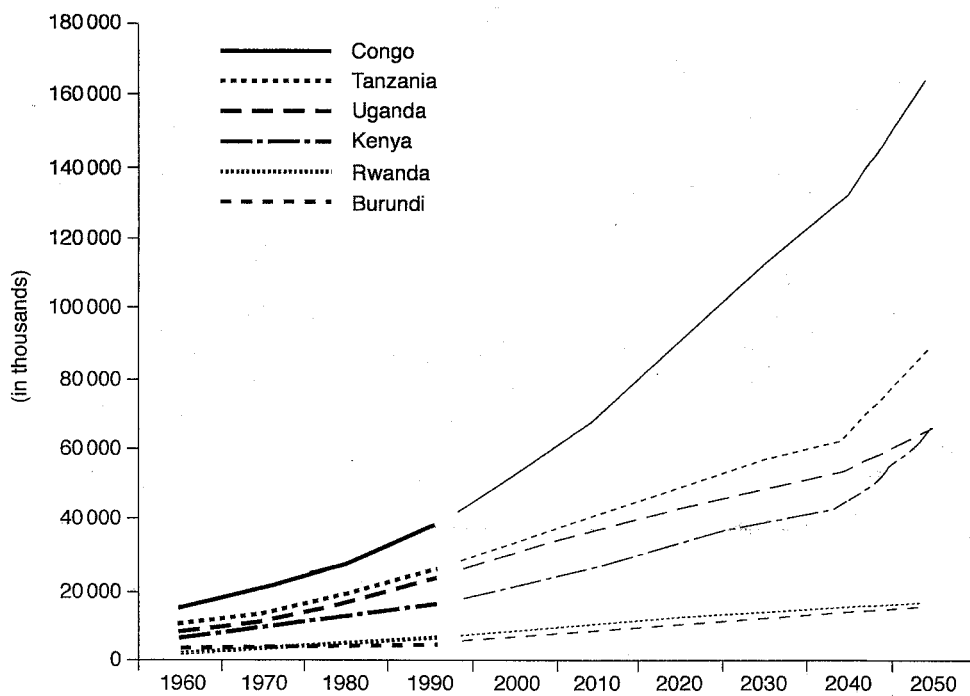


Fig. 4. Population projections (growth and forecast) for countries in the White Nile basin to 2050. Source: 2000 World Development Indicators CD-ROM, World Bank.

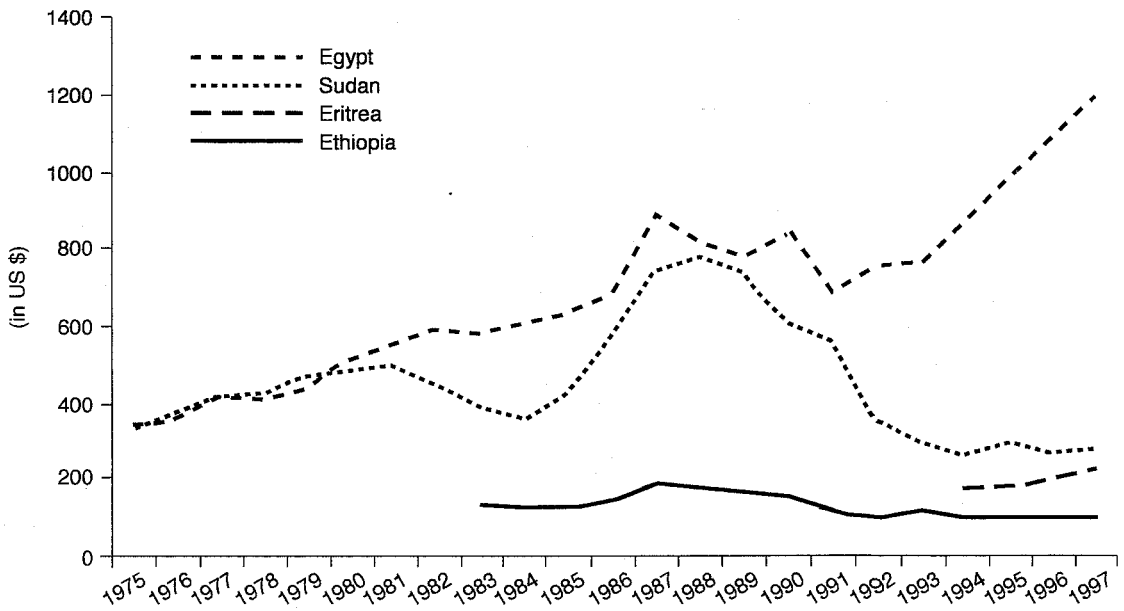


Fig. 5. Economic growth (in GNP per capita) in countries in the Blue Nile basin (1975–1997). Source: 2000 World Development Indicators CD-ROM, World Bank.

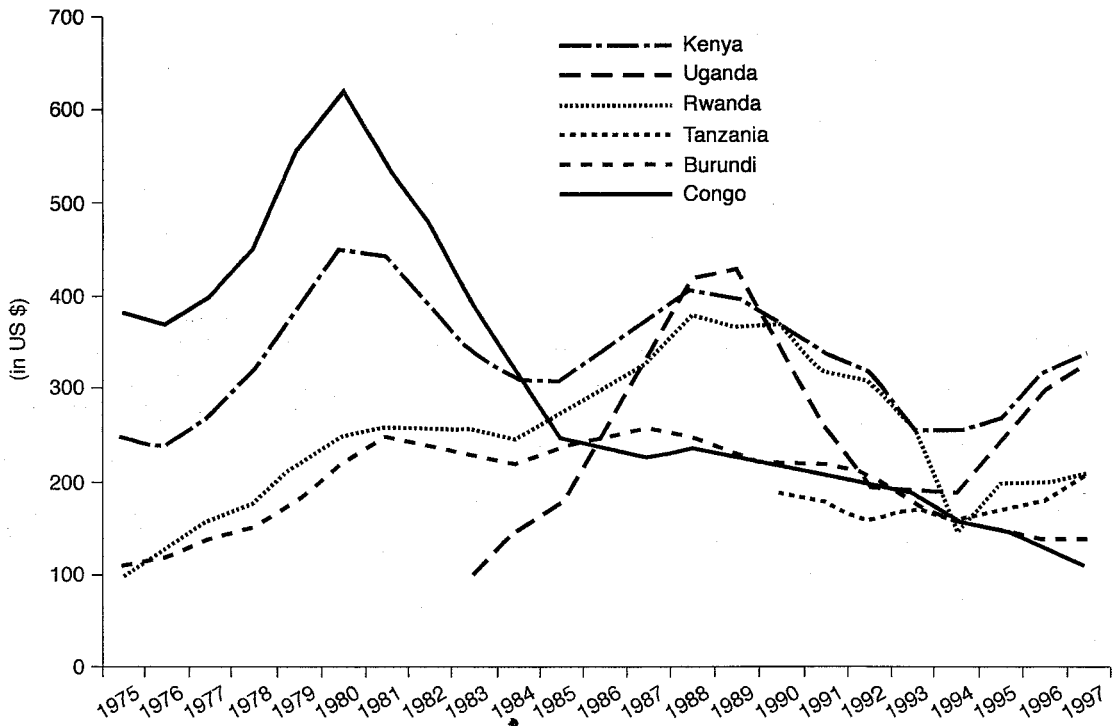


Fig. 6. Economic growth (in GNP per capita) in countries in the White Nile (1975–1997). Source: 2000 World Development Indicators CD-ROM, World Bank.

effects from global warming, the available water supplies in the Nile basin are for all practical purposes currently fully utilized<sup>7</sup>. There are, however, opportunities for water savings and conservation in the Nile riparian countries and for increased yields through cooperative management and investment.

The importance of these driving forces for the future supply and demand balance for water in the region has not gone unnoticed by riparian countries in the Nile basin. Most are making plans for expanded irrigation using Nile waters. Planned increases in irrigation area far outstrip the available water supplies, even assuming the adoption of more water-efficient irrigation technologies. In their quiet moments, the water resources professionals and policymakers in the Nile riparian countries acknowledge that all their plans for expanded irrigation cannot come to pass even with full basin-wide cooperation and more efficient irrigation technologies.

Each riparian country has been thus forced to consider whether it would be better to participate in efforts to reach a cooperative, basin-wide development plan (that is, in game-theoretic terms, to join the “grand coalition”) than to try to maximize its benefits through unilateral actions – knowing that if all riparian countries pursued such unilateral action, conflicts would inevitably arise. The choice is in fact quite complicated and depends mainly on each riparian country’s subjective assessment of five considerations:

- (1) How likely is it that other riparian countries will negotiate with us in good faith?
- (2) What is the likelihood that other riparian countries would retaliate if our country decided not to participate in the cooperative effort and instead pursues its unilateral options?
- (3) What are the scope and consequences of any such retaliation?
- (4) What benefits would our country be likely to obtain in a cooperative solution?
- (5) What are the benefits of a unilateral development strategy?

Figure 7 illustrates the structure of the decision process for an upstream riparian country. There are four possible payoffs. The first branch of the decision tree is whether this upstream country should join the cooperative effort. If it decides to join, suppose that the downstream riparian countries negotiate in good faith and that “reasonable compromises” are made to pursue basin-wide cooperation. This path results in a good outcome for the upstream riparian (case 1). The perceived magnitude of this positive payoff depends on the upstream country’s vision of what cooperative development will entail and how large its own share of the benefits from this development strategy would be.

But suppose that the upstream country decides to participate in cooperative efforts and the downstream countries then do not negotiate in good faith: their participation is simply a ploy to delay the upstream country’s unilateral action, or a ruse to buy time to pursue their own plans. In this instance (case 2) the payoff for the upstream country is poor: it has now lost time and perhaps finds itself in a worse bargaining position than before with respect to its downstream neighbors, having lost face as politically naïve.

Now suppose instead that the upstream riparian decides not to participate at all in joint efforts to find a cooperative solution and immediately proceeds with its own unilateral water resources development

<sup>7</sup> The commonly agreed mean annual flow of the Nile is 84 billion cubic meters (measured at Aswan). The 1959 Nile Waters Agreement allocates 55.5 billion to Egypt; 18.5 billion to Sudan and 10 billion to evaporation and seepage losses from the Aswan High Dam Reservoir. Sudan appears to be using somewhat less than its allocation; evaporation and seepage losses are slightly higher than initially anticipated. The average flow to Egypt is somewhat greater than 55.5 billion cubic meters. Other

plans, designed to maximize its national economic benefits. (This is effectively the decision that Turkey made when it decided to pursue construction of large reservoirs within its territory on the Tigris-Euphrates.) Two broad types of payoff could occur. Downstream riparian countries could react to this upstream decision with major retaliation, which could in the extreme lead to military conflict (case 3). This is the “water wars scenario” that many international observers have predicted for international rivers in the 21st century<sup>8</sup>.

Alternatively, in this situation the downstream riparian countries might conclude that major retaliation is not in fact a feasible or sensible option. Then a unilateral development strategy would prove to be worthwhile for the upstream country: it can proceed toward its own goals with little interference from downstream riparian countries (case 4). This is of course the positive payoff sought by the upstream state.

The complexity of this decision process arises in part because the upstream country may be uncertain how to compare (1) the two “good” payoffs with each other and (2) the two “bad” payoffs with each other. Consider first the two “good” payoffs (cases 1 and 4). At first glance it might appear that case 4 is clearly superior, as here the upstream country is free to use its water resources without being constrained by outside demands from other (downstream) riparian countries. But this assumes that the upstream country has the capital and technological expertise to proceed unilaterally. It also assumes that the country has the domestic markets to sell and/or consume the hydropower and/or agricultural produce resulting from its internal development plans and does not need to trade with downstream (or other) countries. Neither assumption may be true. Comparison of the relative benefits of cases 1 and 4 thus requires careful consideration of the potential benefits of a basin-wide cooperative solution. These benefits will likely be much less apparent to the upstream riparian country than the benefits of unilateral development.

Similarly, the choice between the two “bad” payoffs may not be as obvious as first appears. A downward spiral into water wars (case 3) might seem the worst outcome, but perhaps the upstream riparian country feels that it will fare well militarily. Also, case 2 (in which water resources development is delayed or jeopardized in the upstream country) may be perceived as a path to famine and continued poverty and thus possibly even worse than the water wars scenario.

The upstream riparian country’s choice of whether to participate in a basin-wide cooperative effort thus depends not only on its assessment of the socio-economic payoffs, but also on the political, diplomatic and military strength of the downstream states; on the character and intentions of the leadership of the downstream states; and on the financial and technical ability of the upstream riparian country to launch a unilateral development initiative. This inevitably involves personal, intuitive judgments by the political leadership of the upstream riparian state. But it is nevertheless useful to characterize the economic and political asymmetries of the Nile riparian countries in order to provide a context within which such judgments may be made and understood. Figure 8 shows the relative political and economic strength of the ten Nile riparian countries, using population size and GNP per capita as proxies for political and economic power, respectively. As shown, Egypt is the clear *hegemon* on the Nile in terms of economic strength; its closest rival in terms of population is Ethiopia. Sudan, Uganda, Tanzania and Kenya occupy a middle position behind Egypt in terms of both population and GNP per capita. Rwanda, Burundi and Eritrea (all upstream countries) are quite small in terms of both population size and GNP per capita. This pattern of a downstream population and economic *hegemon*, coupled with two main clusters of upstream riparian countries, is quite unusual among the world’s international rivers (Song & Whittington, 2004).

<sup>8</sup> For a chronology of water conflicts throughout history, see [www.worldwater.org/conflictIntro.htm](http://www.worldwater.org/conflictIntro.htm).

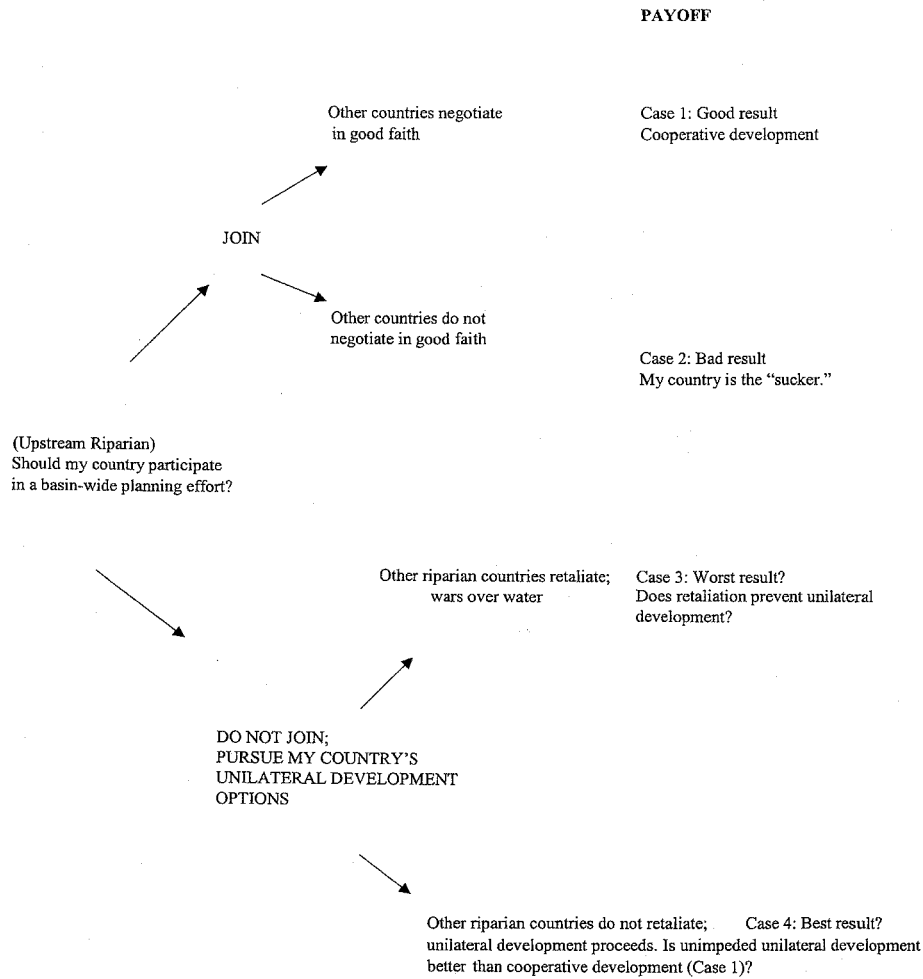


Fig. 7. The upstream riparian state's dilemma.

What is not captured in Figure 8 is the relative importance of the Nile waters to the different riparian countries. Not only is Egypt the economic and political *hegemon* on the Nile, it is also vitally dependent on the Nile, essentially for 100% of its water supply. The Nile is thus without a doubt of the greatest importance to the Egyptian political leadership, an essential geopolitical fact that is well understood by all other riparian countries in the Nile basin. Although Sudan and Ethiopia are not as dependent on its waters as is Egypt, the Nile's importance in the economic development plans of both these countries ensures that the hydro-politics of the Nile commands the full attention of the top political leadership in these states as well. Thus, three of the most powerful countries in the Nile basin are also those with the

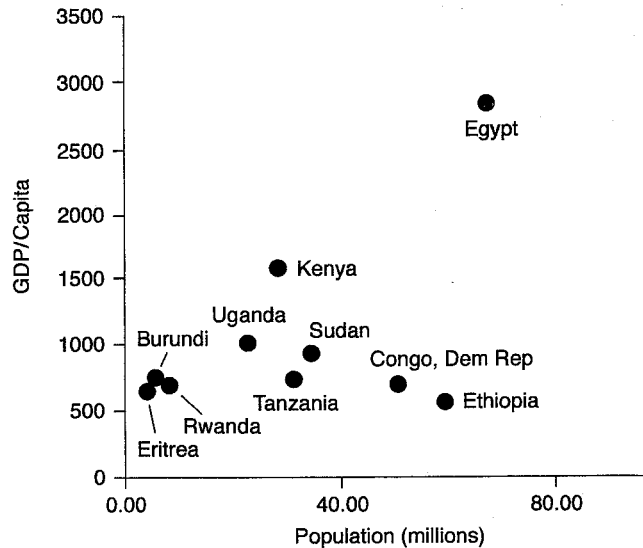


Fig. 8. Political and economic asymmetries among Nile riparian countries.

most at stake. For the remaining seven riparian countries, the hydro-politics of the Nile is important, but it is not an overriding national concern<sup>9</sup>.

Although the Nile remains a potent symbol to both the Egyptian leadership and the Egyptian people of economic well being and development, in fact the Egyptian economy is diversifying and strengthening. The Egyptian economy is becoming less dependent on irrigated agriculture and thus less reliant upon Nile waters. In 1976 the agricultural sector accounted for 28% of Egypt's gross domestic product; by 1997 this had dropped to less than 18%. It is thus important not to assume that the economies of the Nile basin countries are static, or that the political economy of water cannot change.

#### 4. Past visions of Nile basin development

Over the years, the Nile riparian countries have often expressed their desire for equitable, peaceful solutions for the development of the basin.<sup>10</sup> They have also felt free, however, to pursue unilateral water resources development initiatives that served their own national interests. These initiatives were often the

<sup>9</sup> The population of the Congo is close to that of Ethiopia, but only a small portion of the Congolese population actually lives in the Nile basin and the river has less socio-political importance to the Congo than it does to Ethiopia.

<sup>10</sup> For example, an official note between Egypt and Ethiopia in 1993 (*Framework for the General Cooperation between Ethiopia and the Arab Republic of Egypt*) states in part that "the two parties agree that the issue of the Nile Waters shall be worked out in detail through discussions by experts from both sides, on the basis of the rules and principles of international law. Each party shall refrain from engaging in any activity related to the Nile waters that may cause appreciable harm to the interests of the other party. The two parties agree on the necessity of the conservation and protection of the Nile waters. In this regard, they undertake to consult and cooperate in projects that are mutually advantageous, such as projects that would enhance the volume of flow and reduce the loss of Nile waters through comprehensive and integrated development schemes".

result of rational decisions from the context within which they were made, but many such projects made little sense from a basin-wide perspective (Waterbury & Whittington, 1998). When the Nile Basin Initiative was launched in 1997, all the riparian countries faced the fundamental decision of whether to participate in a search for a cooperative basin-wide solution. All decided to join and have now moved farther down the road toward cooperative development. But even the staunchest optimists would not contend that these decisions to engage in serious dialogue about basin-wide cooperation represent irreversible commitments to forego unilateral development. It is thus still worth investigating what past alternative visions of cooperation mean to different water resources professionals and policymakers of the riparian countries and to the international community, for these visions still shape the new cooperative vision that is now developing, as well as the future direction that the Nile Basin Initiative will take.

Let us now consider five different stylized visions of what a cooperative, basin-wide development strategy could mean and what each would be likely to entail for the construction of actual water resources development projects in the Nile basin:

1. Century Storage Plus
2. Water for Peace
3. Southern Lights
4. The Green Nile
5. Economic Partners on the Nile.

*Century Storage Plus* was a vision that involved gradually building everything that has already been proposed in terms of control structures. It was a “business as usual scenario” in the sense that it represented an extension of existing infrastructure plans. *Water for Peace* stressed the importance of cooperation among the Nile riparian countries as a catalyst for regional economic integration and as a necessary condition for avoiding the human and economic tragedy that conflict over water would bring.

*Southern Lights* shifted the focus of cooperative development efforts to the joint gains that are possible from rural electrification and economic development in the upstream riparian countries, particularly in Ethiopia and Uganda. *The Green Nile* was a vision of cooperative Nile development in which priority was placed on the preservation of unique environmental assets. *Economic Partners on the Nile* was a vision of a future in which water was treated as an economic good and market forces were harnessed for the efficient allocation of water among sectors and countries.

#### 4.1. Vision 1: Century Storage Plus (build everything)

One prevalent vision for cooperative Nile development has been the engineer’s dream: to build essentially all the Nile control projects that have been proposed in recent times, including the major structures prescribed in the Century Storage Scheme along with the Ethiopian Blue Nile reservoirs proposed by the US Bureau of Reclamation. Although the construction of such an ambitious series of infrastructure investments would take decades to complete, the vision of a completely tamed Nile has been compelling to many people in the basin. Water could then be delivered on demand to whatever locations the riparian countries would deem appropriate.

If the riparian countries decided to construct a set of projects to fully control Nile flows throughout the basin, these investments would usher in a new era of Nile management, focused not on investment planning and construction but on management questions such as deciding where and how to use the

available water supplies. This would in turn require new concepts and skills and pose problems quite different from the construction of engineering works. Instead of looking for ways to augment supply, water resource managers would need to find ways to use existing supplies more wisely in order to accommodate economic and population growth as well as environmental concerns.

The riparian states naturally had different ideas about how such a fully controlled water supply would actually be used. Upstream countries clearly wanted the right to use some water for new irrigation schemes. But multipurpose dams on both the White and Blue Niles would create *internal* tradeoffs within the upstream riparian countries between hydroelectric power generation and irrigation. In an upstream country, increased irrigation would in many cases reduce its own hydropower generation. It has perhaps not been fully appreciated that the downstream nations – Egypt and Sudan – can play a powerful role in influencing the terms of such internal tradeoffs by offering upstream countries higher prices for electricity: that is, Egypt and Sudan can effectively *pull* more water downstream for their own use in irrigation by offering to pay upstream states more for hydroelectric power.

This first “build everything” vision had the political advantage that most of the upstream states would become able to build some major infrastructure projects within their own countries and worry later about precisely how these might be operated in coordination with other projects. This appeared to be in the upstream riparian countries’ interests and was difficult for downstream riparian countries to accept. However, such large infrastructure projects have powerful constituencies: many interest groups stand to benefit from them. Great fortunes also can be made when undeveloped lands are converted to irrigated acreage.

#### 4.2. Vision 2: Water for Peace (incremental regional economic integration)

In this second vision, cooperative Nile basin planning was seen as the key to solving two much greater regional problems: civil wars and poor macroeconomic performance. In this vision the benefits of cooperation on the Nile would be regional peace and economic growth. From this standpoint, the water infrastructure projects need not in themselves be particularly attractive investments, but they assume great importance because settling disputes over Nile waters would help end civil wars and create an atmosphere of regional trust and cooperation. This could lead to a liberalization of labor and capital markets in the Nile basin and thus foster growth in other sectors. Progress in regional trade, communications and economic integration would have thus been the real benefits of cooperation: the water infrastructure projects were simply a means to this end.

In this vision of Nile cooperation the planning process became as important as the actual outcome. To put the argument in its most stark terms, it did not matter what infrastructure projects the participating countries finally agreed to build as long as they agreed on something. The real purpose of the planning process was to create this atmosphere of trust and cooperation, not to identify an optimal water resources investment plan. It was thus of fundamental importance that the planning process be participatory, so that all parties felt a sense of ownership. Issues such as data sharing and joint technical planning became important because they built personal ties among water resources professionals and policymakers in participating countries.

Here the role of donors was to provide sufficient subsidies for water infrastructure projects to ensure that the countries involved moved out of their low-level equilibrium trap of distrust, civil war and economic isolation. Investments that would generate global environmental controversy (such as the Jongeli canal or large dams in the Blue Nile gorge) were to be avoided, not because of the environmental



losses *per se* but rather because such outside controversy and opposition could have engendered distrust and conflict among the riparian participants themselves.

Proponents of this vision of cooperation were hopeful that a few relatively uncontroversial water infrastructure projects would have been enough to usher in a new era of peace and economic integration. Likely candidates included a single dam on the Blue Nile (perhaps not far from the site of the US Bureau of Reclamation's Border dam near the Sudanese–Ethiopian border), regional integration of the electricity grid between Ethiopia and Sudan and selected hydroelectric facilities on the White Nile north of the Owen Falls Dam – and lots of technical assistance, training, capacity building and assistance in other sectors.

The argument underpinning this vision raised an obvious question: could the benefits of regional economic integration be achieved without having to make potentially unattractive investments in water infrastructure? Proponents had a two-pronged answer to this question. First, they did not agree that water infrastructure investments will fail a cost-benefit test based solely on the traditional measures of project outputs (e.g. irrigation water, flood control, hydroelectric power generation), only that these were in fact a small portion of the real benefits of cooperation. Water infrastructure projects may be quintessential “old economy” investments (i.e. providing basic goods and services and not relying on the information technology of the “new economy”), but this does not mean they necessarily have low economic rates of return.

Second, they hold that there really is no alternative path to regional trust and cooperation. From an economic perspective the value of water in the Nile basin is in fact much smaller than commonly believed and thus the direct economic benefits of water infrastructure projects are probably not that large. But in this vision the Nile riparian countries remained locked in an “old economy” vision of economic development. Seen thus, it is unfortunate that Nile water held such great symbolic significance, but that was political reality. Particularly, Egypt's relations with other riparian countries were fundamentally shaped by its Nile water policy. In this second vision, the establishment of a process for working toward a fair and equitable allocation of Nile waters among the riparian countries was the Gordian knot that must be cut before riparian states could think seriously and systematically about how to enter the global economy of the 21st century.

Proponents of *Century Storage Plus* might have supported *Water for Peace* as a strategic move to “break the ice” for new construction. Since infrastructure development would have had to start somewhere, *Water for Peace* may have been regarded as a stepping stone to *Century Storage Plus*.

#### 4.3. Vision 3: Southern Lights (rural electrification and irrigation in the Ethiopian highlands and around Lake Victoria)

Today if one flies at night over the Nile Valley from the Mediterranean to Khartoum, the cultivated strip along the Nile is almost continuously aglow with the lights of small villages (except along the shores of the Aswan High Dam Reservoir). Continuing south, as soon as one crosses the Sudanese–Ethiopian border, the Ethiopian highlands appear as a black void, with only a few clusters of lights in small towns showing before one reaches Addis Ababa.

The third vision of cooperative development along the Nile placed priority on the needs of the upstream countries, Ethiopia and the Equatorial States. It offered the logical counterpoint to the Century Storage Scheme, which would have increased water yields for the downstream countries. In this vision, water infrastructure investment would have focused on the Blue Nile dams in Ethiopia, hydroelectric

facilities on the White Nile north of Lake Victoria and irrigation schemes both in the Ethiopian highlands and around Lake Victoria. Like Vision 1, *Century Storage Plus*, this vision would have coupled some version of the US Bureau of Reclamation's development plan for Ethiopia with some pieces of Hurst's Century Storage Scheme for the White Nile. What Hurst did not envision, and what this third vision included, was large-scale irrigation around Lake Victoria. By contrast, the Jonglei Canal was not an important project here.

Though one might well question whether this development strategy may be accurately characterized as cooperative, given that it focused primarily on the upstream states, proponents advanced four arguments that it was indeed both equitable and economically sound. First, upstream infrastructure investments on the Blue Nile do indeed benefit downstream riparian countries. Flood damage to human settlements, irrigated agriculture and hydrologic control structures in Sudan would be substantially reduced by control of the Blue Nile flood. Shifting water storage from the Aswan High Dam Reservoir upstream to the Blue Nile reservoirs in Ethiopia would reduce system-wide evaporation losses. Sudan and Egypt both would benefit from the integration of electrical distribution networks and the ability to purchase cheap hydroelectric power from Ethiopia and Uganda.

Second, proponents of upstream development argued that from the perspective of economic efficiency, the losses Egypt might suffer from slightly reduced water supplies would be very small compared to the economic benefits accruing to upstream riparian countries from supplies retained. This is because the economic value of water to Egyptian and Sudanese farmers is currently so low. Upstream irrigation would induce system-wide benefits by forcing downstream irrigators to adopt water conservation measures. From this standpoint, the economic value of water in land reclamation efforts in the Egyptian desert is so low that upstream riparian countries would have been doing Egypt a favor if they had persuaded Egypt to forgo investments in its New Valley project (of course, this did not account for the symbolic importance of land reclamation to Egypt).

The third and fourth arguments in support of this third vision were based on notions of equity rather than efficiency. The upstream riparian countries are much poorer than Egypt (although not Sudan). Fairness would require that at least some focus be placed on alleviating the most severe poverty in the Nile basin. In particular, if alleviation of poverty is a key priority, donors should focus on projects such as the electrification of the homes of tens of millions of peasants in the Ethiopian highlands who lack that service. (The vast majority of the Egyptian population already has residential electricity.)

Basic fairness and international law also support a nation's right to use the water that originates within its borders. Approximately 86% of the Nile water that flows to Egypt originates in Ethiopia, yet currently Ethiopia essentially uses none. Ethiopia and the Equatorial States thus all claim rights to an equitable portion of the Nile resources. Since they presently use so little Nile water, they argued that fairness dictated that they should receive priority in any donor-supported regional investment program. To the extent that this *Southern Lights* vision focused on hydropower development and rural electrification instead of expanded irrigation, it would have become more acceptable to downstream riparian countries.

#### 4.4. Vision 4: The Green Nile (protecting environmental assets)

This fourth vision of cooperative Nile development started with the concept that sustainable development required that environmental concerns do not take a backseat to short-sighted economic development goals. From the environmental perspective, the Nile riparian countries must not repeat the serious mistakes now apparent in water development in the western United States. Environmental assets

must be preserved for future generations and for the broader global community. The role of international donors should be to ensure that environmental and developmental goals are viewed as complementary and that unique environmental assets are not sacrificed for short-term economic gains.

In this vision there were three main natural assets to preserve in the Nile basin and one major environmental problem to solve. The three crucial environmental assets are (1) the Sudd, the largest freshwater swamp in the world and winter home to many of Europe's bird populations; (2) the undeveloped and largely unexplored great canyons of the Blue Nile gorge; and (3) the Lake Victoria freshwater ecosystem. The primary environmental problem was deforestation in the Ethiopian highlands.

Two of these three major environmental assets in the Nile basin are directly threatened by water resources development plans. In an environmental vision of cooperative Nile development, there were no win-win opportunities with respect to the Sudd swamps and the Blue Nile canyons, only hard tradeoffs. The Sudd swamps would be fundamentally altered by the completion of the Jonglei Canal; the canyons of the Blue Nile gorge would be lost if submerged by dams on the Blue Nile. Some environmentalists might reconcile themselves to a planning process that would seek the least environmentally damaging dam site on the Ethiopian portion of the Blue Nile and to a Jonglei project that would be operated to increase the water yield downstream of the Sudd swamps while at the same time preserving some of the traditional flooding in the area. But for many environmentalists these compromises are distasteful, Faustian bargains – not win-win opportunities.

The environmentally sound management of Lake Victoria is a different kind of problem from the protection of the Blue Nile canyons and the Sudd swamps. In the long term Lake Victoria could conceivably be threatened by large-scale water withdrawals for new irrigation schemes in the Equatorial States (principally Uganda, Kenya and Tanzania), but there is no single infrastructure project that would cause immediate environmental catastrophe. Similarly, the water quality of Lake Victoria needs to be protected from municipal and industrial pollution along its shores and tributaries and from agricultural runoff, but this is a routine, albeit important, environmental management task.

The environmental problems posed by the deforestation of the Ethiopian highlands and the consequent soil erosion have inspired apocalyptic predictions for several decades. Garrett Hardin has predicted that the Ethiopian population would ultimately collapse owing to a shortage of food supplies resulting from the loss of soil fertility<sup>11</sup>. A green vision of the Nile basin included reforested Ethiopian highlands in which soil erosion is halted, rainfall would be captured by forest and crop cover and groundwater aquifers restored. This would have come to pass largely through participatory, community-based action plans supported by the Ethiopian government and international donors. For proponents of *The Green Nile* vision, the reforestation of the Ethiopian highlands was a much wiser investment than large dams on the Blue Nile.

There was an additional element in the green vision of cooperative Nile development: increased awareness that the region's unique, rich and various environmental assets were important to people throughout the world, not just to people in their immediate environs or even in the Nile basin. Environmental assets such as the Sudd swamps and the Blue Nile canyons are now perceived by many people to be *international public goods* and their preservation is of value to people everywhere. Global environmental groups thus claim that they too have standing in the dialogue about what happens to international public goods and are thus legitimate stakeholders in discussions over future Nile development. As a practical matter, their voices can be heard largely through international donor organizations, but this is not an insignificant avenue of influence.

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<sup>11</sup> Personal communication, 1988.

With this recognition that environmental assets in the Nile basin are international public goods comes international responsibility for paying for their preservation. An important financial aspect of this fourth, green vision of cooperative Nile development was thus that the international community should pay compensation to Nile riparian countries. Such compensation could take many forms, from grants and loans for subsidized infrastructure of less environmentally damaging projects to debt forgiveness and debt-for-nature swaps (Whittington & McClelland, 1992). But from the environmentalists' perspective there must be a hard deal with Nile riparian nations: the *quid pro quo* for international financing is their agreement to protect unique environmental assets within their borders and their serious commitment to tackle tough, regional environmental problems such as reforestation in the Ethiopian highlands.

#### 4.5. Vision 5: Economic Partners on the Nile (treating water as an economic good)

The fifth vision of cooperative effort on development of the Nile basin originated in the notions that (1) real economic benefits from water resources development can only be achieved when water is allocated to its highest-value uses and (2) market institutions are required for this to happen. From this perspective, top-down national governmental planning of irrigated agriculture was a proven recipe for economic disaster and little would have been gained from cooperation if that planning approach had been the practical result of any new collaborative agreement.

Proponents of this fifth vision emphasized that the economic value of water in irrigated agriculture in different countries is not inherently fixed, but rather depends on the incentives farmers face to use water efficiently. Countries with sound macroeconomic, trade and agricultural policies will allow farmers to reap the gains from agricultural production and these farmers will be able to pay more for water than farmers elsewhere who are heavily taxed, or who are forced by government to make non-economic crop selections. Depending on the economic policy framework in place in different riparian countries, the highest economic value of water in irrigated agriculture might occur in any one of these countries.

In this fifth vision riparian countries would have separated the question of who has rights to Nile waters from the question of where the water might best be used for irrigated agriculture and other purposes. Holders of water rights would be free to use the water themselves or sell it to other users in the basin. Proponents of this vision did not perceive the need to settle the rights issue as a Herculean political task. If riparian countries could not agree on final water rights, then it should be easier to implement long-term leases that could be renegotiated from time to time. A basin-wide authority could be responsible for granting leases and for the collection and use of lease fees. Proponents of this *Economic Partners on the Nile* vision did not minimize the many difficulties involved in establishing a trans-boundary Nile water market, but the successful use of water markets in the Murray-Darling Basin in Australia and elsewhere over the past decade made this vision of market forces being harnessed to maximize the economic value of water seem more feasible.

In one important respect this fifth vision (*Economic Partners on the Nile*) was similar to the second vision (*Water for Peace*), in that the real benefits of introducing market institutions in the water sector were not to be reckoned simply in terms of enhanced hydropower and irrigated agriculture *per se*, but rather in terms of the pressures such market forces would exert on the riparian countries to recognize inefficiencies in their existing macroeconomic and trade policies and to restructure such policies toward better entry into the global economy. From this perspective, investments in water resources infrastructure and water market institutions can be a major catalyst for further systematic changes in the regional economies of Nile riparian countries.

## 5. Nile visions: a country-by-country perspective

Some support for each of these five visions was likely still to have existed in each of the Nile riparian countries before the Nile Basin Initiative was launched, but the preponderance of opinion within the technical-political elite in any given country probably gravitated toward one or perhaps two of the five visions. Today participants in the Nile Basin Initiative are all moving together towards a consensus vision of Nile Development, but some remnants of the five past visions probably still remain.

### 5.1. Egypt

Historically Egypt tended to envisage engineering works that would fully control the flow of the Nile – some variation of Vision 1, *Century Storage Plus*. What Egypt had not hitherto confronted was a version of *Century Storage Plus* in which it would receive a reduced amount of water. Without a firm agreement on water allocation, for Egypt *Century Storage Plus* could have easily become a shadow scenario of *Southern Lights* – in which infrastructure became focused on benefits to upstream riparian countries.

It would appear that for Egypt, *Water for Peace* (Vision 2) was an attractive next-best scenario, in which Egypt was not threatened by the development of large-scale irrigation schemes upstream and the Nile waters would have continued to flow northward relatively unimpeded to the Aswan High Dam Reservoir. Egypt would certainly have stood to benefit from regional peace and economic integration. Egypt would of course have much preferred that one of the limited projects in *Water for Peace* had been the completion of the Jonglei Canal. It is interesting to note that (with this notable exception) there was otherwise a natural confluence of interests between Egypt and proponents of *The Green Nile* vision.

In the past Egypt has been one of the strongest opponents of the idea of treating water as an economic good and thus appeared to be one of the harshest critics of any vision resembling *Economic Partners on the Nile*. This is somewhat ironic, as Egypt and Sudan seem to be major beneficiaries of an economic approach to Nile water allocation. This is because from a system-wide perspective it usually makes sense to let water flow through hydroelectric power facilities before withdrawing it for irrigation purposes. If the objective were to maximize basin-wide economic benefits, the last thing one would want to do would be to withdraw water for irrigation in Ethiopia upstream of Blue Nile hydropower facilities. This would imply that *ceteris paribus* downstream users would be able to pay more for water than upstream users in a market-oriented allocation scheme.

### 5.2. Ethiopia

Historically, opinion in Ethiopia has coalesced around the need for major water resources development in the Blue Nile basin. The only question has been where the capital would come from to finance the needed infrastructure and the precise configuration of projects. The Ethiopian leadership thus naturally gravitated to *Southern Lights* or some version of *Century Storage Plus*. The other three visions were all troublesome. *Water for Peace* could have led to a scenario in which little capital would be available from donors for Blue Nile development. (A potential advantage would have been that it might have led to an agreement in which Egypt could not have claimed increasing quantities of Nile water for its reclamation projects.) *Economic Partners on the Nile* would be likely to have led to a focus on hydropower generation in Ethiopia at the expense of large-scale irrigation; a basin-wide tradeoff that Ethiopian water resources professionals and policymakers had not cared to address systematically.

Perhaps the most perplexing vision for Ethiopia has been *The Green Nile* because it would pit the international environmental community against the needs of the Ethiopian people for integrated water resources development. In the past Egypt might have relished letting the international environmental community lead the charge against large dams in the Blue Nile gorge. In the current cooperative spirit of basin-wide development, it may well fall to Egypt to defend Ethiopia's interests in large dams and increased irrigation against possible attacks by the international environmental community. Without the support of Egypt and Sudan, it is certainly conceivable that Ethiopia could find itself isolated in the debate over large dams, with few natural allies.

### 5.3. Sudan

Sudan on the other hand stands to benefit greatly in all five alternative visions and is a pivotal political player in each. In *Century Storage Plus*, Sudan should receive flood control benefits and the ability to purchase low-cost hydropower from Ethiopia. The likely projects in a *Water for Peace* development strategy would also benefit Sudan, particularly a dam on the Sudanese–Ethiopian border. Wracked by civil war for decades, Sudan has become isolated from other riparian states. It would be the big winner in efforts promoting regional peace and economic integration. Moreover, Sudan does not really need many of the large-scale investments contemplated in *Century Storage Plus* or *Southern Lights*, but neither would it be hurt by them.

*The Green Nile* vision may not be attractive to Sudan, but if compensation were paid by the international community for downsizing or simply not completing the Jonglei Canal, Sudan would be likely to be the major recipient of such aid. A win-win deal might well be structured for Sudan that would be consistent with *The Green Nile* vision. In an *Economic Partners on the Nile* scenario, Sudanese farmers could easily end up being able to pay more for irrigation water supplies than farmers elsewhere in the basin and thus Sudan might achieve a larger irrigated agriculture sector under a market-type solution than under a top-down water allocation scheme with no water trades between countries. That Sudan fares well in so many alternative visions of cooperative development gives it considerable leverage in negotiations because it might plausibly form a variety of coalitions with different riparian neighbors and with international donors.

### 5.4. Equatorial States

The Equatorial States (particularly Uganda, Tanzania and Kenya) would naturally gravitate toward the *Southern Lights* development vision. But, unlike Ethiopia they have less to offer downstream riparian countries. Nor do they have much incentive to join in a cooperative development effort. The development of irrigation schemes in the Equatorial States would have less of an effect on the quantity of water available to downstream riparian countries than withdrawals by Ethiopia on the Blue Nile, in that much of the water used for irrigation in the Equatorial States would have been lost to evaporation in Lake Victoria and the Sudd swamps anyway.

If the evolving cooperative vision for Nile development includes a significant amount of irrigation around Lake Victoria and its tributaries, the Equatorial States may find themselves with much in common with proponents of *The Green Nile* vision, as the downstream riparian countries will have much less objection to their irrigation schemes if the Jonglei Canal is not completed.

The Equatorial States probably have relatively little to gain in either the *Water for Peace* or the *Economic Partners on the Nile* visions. The few infrastructure projects that would have been built in a

*Water for Peace* scenario would have been unlikely to affect the Equatorial States very much. It is not clear just how these states would have fared in the *Economic Partners on the Nile* scenario. But if hydroelectric power generation facilities were built on the White Nile and the Jonglei Canal were finished, irrigation demands downstream would be likely to pull water through the White Nile power facilities and away from upstream irrigation. The White Nile riparian countries could, of course, receive revenues from such electricity sales and compensation for agreement to allow construction of control structures on their territories.

## 6. Concluding remarks

In the past climate of distrust and suspicion among riparian countries, it is understandable that different competing visions of river basin development emerged in the Nile basin. However, even in the present era of cooperation, it is natural that riparian countries have different interests and values and the task of crafting a consensus vision of cooperative development remains challenging. In order to continue moving forward towards such a consensus vision of cooperative development, it is helpful to look at the alternative visions described in this paper to understand better the different interests and positions of riparian countries.

In fact, I believe there is a common thread tying all five of these alternative visions together: the desire of all riparian countries for peace and economic development. Each of the five visions describes a peaceful future in which its proponents believe economic prosperity will flourish. The task of articulating the details of a consensus vision of cooperative river basin development thus entails looking carefully at the components of each of the five visions in order to understand better how cooperation can create economic benefits that can be shared among all the Nile riparian countries. Economics can provide the tools, concepts and language to make the slogans of “sharing benefits, not water”, and “finding win-win opportunities” real and thus enable a consensus vision of cooperative river basin development to be translated into a practical program of investments and policies (Sadoff *et al.*, 2002).

Creating a consensus vision of cooperative Nile development and translating this vision into a program for long-term water resources and economic development of the Nile basin will be the most complex intellectual activity that most participants in the Nile Basin Initiative will tackle during their lifetime. Many different people will be needed to handle the sheer complexity of the technical, economic and political challenges of trans-boundary water resources development and it is inevitable that most participants will develop simplified mental heuristics for understanding such a complex planning problem. It should thus not be a surprise that the ongoing search for a consensus vision of what cooperative development of the Nile could mean will be difficult.

One of the advantages of thinking explicitly about these alternative visions is that comparisons can reveal surprising compromises – or coalitions – that may become possible between Nile riparian countries even though some members of the political leadership in these various countries may still hold quite different ideas about the objectives of cooperative development. For example, an examination of the visions described in this paper revealed that in the absence of cooperation, Egypt could have found itself allied with international environmental groups against the construction of some of the large dams projected for the Ethiopian Blue Nile. Similarly, the Equatorial States’ interests in the Jonglei Canal project are much more complicated than might at first appear. The completion of the Jonglei Canal

would significantly extend the reach of Egypt's interest in irrigation activities around Lake Victoria. Completion of both the Jonglei Canal and the White Nile hydroelectric projects would introduce a new dynamic into this equation by increasing the incentive for the Equatorial States to send water to downstream riparian countries (because this will generate additional hydropower at home).

The Nile Basin Initiative has come a long way in the past few years by promising win-win opportunities to all riparian countries and holding out the promise of regional peace and prosperity. Continued progress will require not only a willingness from Nile riparian countries to continue revising their past visions of cooperation but also the creativity to assemble different pieces of the infrastructure puzzle to achieve the objectives of more than one of these five visions simultaneously. The most promising avenue to discovering such creative solutions is to develop a deeper understanding of the historical, socio-cultural and political underpinnings of the economics of Nile water management and the role that water plays in the economies of the riparian countries.

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