

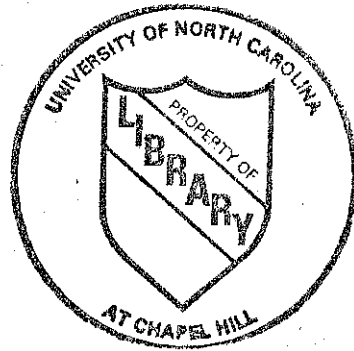
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Toward a New Nile Waters Agreement

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The objective in this chapter is to offer some thoughts about the possible content of a new Nile Waters Agreement. We will largely restrict our focus to the problems facing those riparians with a stake in the management of the Blue Nile water resources—Egypt, Sudan, and Ethiopia—because problems there are most pressing.

Establishing or changing the allocation of property rights for a major international river such as the Nile is always a political task of monumental proportions. Therefore, it is important to begin with a few background details of the existing regime and to explain why a renegotiation is necessary for these Nile riparians.

CURRENT SITUATION

The 1959 Nile Waters Agreement was negotiated by Egypt and Sudan to allocate the long-term historical yield of the Nile River between these two countries. The net annual historical yield, calculated at 74 billion cubic meters (BCM) at the Aswan Dam, was divided so that Egypt had rights to 55.5 BCM per year and Sudan to 18.5 BCM per year. Ethiopia was not a party in these negotiations, and none of the total available water supplies was allocated to meet its future needs.

There are several developments that necessitate the renegotiation of the 1959 Nile Waters Agreement in the medium- to long-term future. The most important are the demographic trends in Ethiopia and Egypt. By the year 2025, Ethiopia is forecast to have a population of approximately 122 million, 20 percent higher than that of Egypt. This population increase will require Ethiopia to expand its food production dramatically, but there are few avenues open to Ethiopia for such expansion. Environmental degradation in the

Ethiopian highlands is proceeding at an alarming rate, and agriculture there is unlikely to be able to sustain its present output, much less support the projected huge population increase. Purchasing food supplies in international markets requires foreign exchange that Ethiopia will probably find difficult to earn.

One obvious way for Ethiopia to increase food supplies is to develop irrigation schemes in the western watersheds of the country and to irrigate them with Nile water. Abate (1992) estimated that Ethiopia has 0.9 million hectares of irrigable land in the Blue Nile Basin and 1.5 million hectares in the Sobat Basin (a White Nile tributary) that could be used for this purpose.¹ If we assume that this quantity of irrigable land is available, depending on the irrigation technology and the intensity of cultivation, such an effort could require 20 to 30 BCM of water.² Yet currently, Ethiopia has no water allocation under the 1959 agreement, even though about 85 percent of the water arriving at the Aswan High Dam originates in Ethiopia.

With Ethiopia apparently reentering the world community, it will presumably soon seek international financing for some of these water development and irrigation projects. Before committing funds to such projects, international financing agencies such as the World Bank will require the Nile riparian countries to consider, and hopefully resolve, any disputes over water rights.

The population of Egypt is also growing rapidly. To meet Egypt's needs for increased food supplies, the current Egyptian Land Master Plan calls for reclaiming 0.58 million hectares in the near- to medium-term future. Drainage water is to be used for irrigating the first 0.34 million hectares reclaimed, but additional water supplies will be needed to proceed with the overall desert reclamation program. By the year 2000, agricultural water use in Egypt is forecast to increase by over 10 BCM (Abu-Zeid & Rady, 1991).³ These additional resources are assumed to come from several sources, including the reuse of treated municipal wastewater; improvements in water use efficiency; groundwater from the Delta, Nile Valley, and western deserts; and the completion of the first stage of the Jonglei project.⁴ However, because municipal and industrial demands for water within Egypt are also increasing, these ambitious plans will clearly push Egypt over the limit of its currently available resources.

Sudan likewise has plans for expanded irrigation, although it has little chance of finding financing for them in the foreseeable future. The basic problem facing Egypt, Ethiopia, and Sudan is thus a familiar one: There is not enough Nile water available to complete all the irrigation schemes on the drawing boards of these three riparian countries. Most international observers, and the riparian countries themselves, have generally conceived the solution to this problem to be a collective agreement on how the average flow of the Nile should be allocated among the various parties. This formulation certainly captures some important elements of the problem. However, in this chapter we

will argue that it is too limited a vision of the possibilities to serve as a basis for negotiation and that a new Nile Waters Agreement should have several new dimensions that would make it quite different from the previous legal accords—the 1929 and 1959 Nile Waters Agreements.

A NEW NILE WATERS AGREEMENT

A new Nile Waters Agreement should address the six major issues outlined below. In essence, the new agreement would focus on opportunities for expanding the usable yield of the Blue Nile River Basin and encourage interdependencies among these basin countries. Allocations of water rights would include provisions for apportionment in times of scarcity and establish, at least in principle, guidelines for a regional water market in the upper basin.

Exploitation of Opportunities for Joint Gains

Nile water management is not strictly a zero-sum game. There is some scope for cooperative behavior that would increase the long-term yield, and a new agreement could ensure that such possibilities are fully exploited. The most promising possibility is the construction of the Blue Nile Reservoirs in Ethiopia (Guariso & Whittington, 1987). One of the numerous advantages of these reservoirs is that they would enable over-year storage to be shifted from the Aswan High Dam Reservoir upstream so that evaporation losses would be much reduced. In the upper Blue Nile region, evaporation rates are approximately 50 percent of those in Sudan and Egypt. Reductions in evaporation loss would be realized both through lower evaporation rates and through lower surface-to-volume ratios in the canyon sites of the Blue Nile Reservoirs (U.S. Bureau of Reclamation, 1964). At present, only crude estimates of the possible water savings are available, but they would probably be on the order of 4 to 5 BCM per year. Another opportunity for regional cooperation is the elimination of the Jebel Aulia Reservoir on the White Nile, where annual evaporation losses are currently about 2.8 BCM (Whittington & McClelland, 1992).

Any new agreement about the allocation of the long-term yield of the river among the riparian countries could be made contingent on the completion of these two projects that would increase available water supplies. For purposes of discussion, we assume that the increase in long-term yield resulting from both the construction of the Blue Nile Reservoirs and the elimination of evaporation losses at the Jebel Aulia Reservoir will be 6 BCM. If we take the conservative position that none of the other water conservation projects on the White Nile will be completed due to environmental and political concerns, then (based on the historic record of the last century) the available long-term yield

can be estimated at about 80 BCM (measured at Aswan, after deduction for the remaining evaporation and seepage losses from the Aswan Dam Reservoir).

Allocation of the Long-Term Yield

Once the long-term yields are estimated, the traditional problem remains of negotiating the shares of Egypt, Sudan, and Ethiopia. Two general approaches to a solution might be considered. First, the parties could agree to split the difference between Egypt's long-held position that Ethiopia's share should be minimal because it has other sources of water and Ethiopia's position that it should be entitled to develop its total irrigable area (for argument's sake, say this area would require 20 BCM measured at Aswan). Such a compromise would result in an Ethiopian allocation of about 10 BCM. Because the 1959 agreement requires that any allocation to upstream riparians not included in the agreement be deducted equally from Egypt's and Sudan's share, Egypt's allocation would be reduced to 53.5 and Sudan's to 16.5 BCM.

A second line of reasoning might be that Ethiopia's share of Nile water should be at least equal to Sudan's, based on the argument that both countries have more potentially irrigable land than can ever be used, given the limited water supplies, and that Ethiopia's population is approximately twice as large as Sudan's. This approach results in somewhat more water for Ethiopia, with the following approximate allocation: 52 BCM for Egypt, 14 BCM for Sudan, and 14 BCM for Ethiopia.

Splitting the difference between these two calculations, assume for purposes of illustration that Ethiopia receives a water allocation of 12 BCM measured at Aswan. This allocation would reduce Egypt's share to 52.5 BCM and Sudan's to 15.5 BCM. Table 14.1 compares this new allocation to the allocation under the 1959 Nile Waters Agreement and the country of origin of the Nile water.

A reallocation of Nile waters of this order of magnitude would appear to be advantageous for all three parties. Current water users in the basin could sustain their existing water uses. Egypt would give up only 5 percent of its existing allocation in return for Ethiopia's acknowledgment and guarantee of its historic rights to the majority of the Nile waters. Sudan would face a substantial reduction in its current allocations under the 1959 agreement (from 18.5 billion to 15.5 billion). Since Sudan is not currently using its full allocation, this reduction would fall entirely on future users. However, within Sudan there is still much highly fertile and easily irrigable land, given adequate river control. Thus, while the construction of the Blue Nile Reservoirs would be a major benefit to Sudan because it would control the Blue Nile flood and

Table 14.1

Origin of the Nile Waters and Comparison of Water Allocations Under the 1959 Nile Waters Agreement with a Possible New Nile Waters Agreement (in billion cubic meters)

	Origin of Water	1959 Nile Waters Agreement	Possible New Nile Waters Agreement
Egypt	0	55.5	52.5
Sudan	Minimal Contribution	18.5	15.5
Ethiopia	72	0	12.0
Other riparian countries	12	0	0
Losses to evaporation and seepage	NA	10.0	6.0
Usable Long-Term Yield	NA	74	80

Source: Whittington and McClelland, 1992.

NA = Not applicable.

provide over-year storage, other incentives, discussed below, also may be required to reach consensus on a new allocation.

This new allocation is clearly dependent on the 6 BCM in increased long-term yield estimated to result from reduction in losses at Jebel Aulia Reservoir and the construction of the Blue Nile Reservoirs. Although it would take several decades to complete the construction of the Blue Nile Reservoirs, it will also require several decades to develop Ethiopia's irrigation schemes. It would be possible to structure a new agreement so that some portion of Ethiopia's share only becomes available as the Blue Nile projects are completed. Such an arrangement would allow Ethiopia to obtain international financing for irrigation schemes and the Blue Nile projects without interfering with existing water use in Egypt or Sudan.

Another possible side arrangement could be based on the allocation of any future benefits arising from the completion of the Jonglei I and II projects. Since a share of 12 BCM would satisfy Ethiopia's needs for Nile water far into the future, Ethiopia might agree that any future water savings from White Nile projects (other than reduction of losses at Jebel Aulia Reservoir), including Jonglei I, would be split solely between Egypt and Sudan. Such a provision would increase substantially these countries' water allocations if the political problems in southern Sudan were resolved and if future agreements could be reached with Uganda and other White Nile riparians. This arrangement would

not, of course, preclude Ethiopia's taking part of its 12 BCM from White Nile tributaries.

Management of Water Shortages

Little attention was paid in the 1959 agreement to the problem of managing water shortages. The agreement simply specified that any temporary shortfalls in yield would be split equally between Egypt and Sudan. A new Nile Waters Agreement will have to address more carefully the issue of how reductions in yield would be handled by the major riparians. The problem is complicated by the possibility of long-term climatic change in the basin and the potential of the Blue Nile Reservoirs to withhold some water from downstream riparians during dry years.

The possibility of the Blue Nile Reservoirs being operated during a drought to strategically withhold water from Egypt and Sudan is an ancient nightmare of Egypt, and Ethiopia must offer specific and concrete proposals to allay Egyptian fears in this regard. In fact, it is difficult to envision a situation in which it would actually be in Ethiopia's economic interests to add water to reservoir storage on the Blue Nile during a drought for two reasons: Withholding water would reduce hydroelectric output; and since these potential reservoirs are located in deep canyons well below the irrigable plateau, they are not expected to contribute to water storage for irrigation use in Ethiopia.

Two possible ways of assuring Egypt and Sudan about the security of their water supplies during droughts are for the countries to (1) develop and agree on specific operating rules for the reservoirs and (2) agree to abide by general principles for water sharing and submit to binding arbitration if the parties are unable to reach a consensus. Such agreements conceivably could be counter-signed by the United Nations as a means of guaranteeing Ethiopia's compliance.

Establishment of Regional Water Markets

In the March 28, 1992, issue, the editors of *The Economist* suggested that "for Egypt the cheapest way to get more water may be to pay Ethiopia to use its offtake from the Nile more frugally" ("The First Commodity," 1992, p. 11). Since Ethiopia is not currently using any significant amount of Nile water, such a trade is not now possible. However, once property rights are assigned and Ethiopia receives a legal allocation of Nile waters, it would be possible, at least conceptually, for Egypt, Sudan, and Ethiopia to buy and sell water rights from one another. The establishment of a mechanism for basin-

wide buying and selling of water would be the single most important innovation that could be introduced in a new agreement.

The establishment of a regional water market would have numerous benefits. Foremost among these benefits would be the ability of a market to allocate water to areas where it will have the highest economic returns, thus promoting regional economic development. Much new and valuable information would emerge on the returns to Nile water in different locations and to different users. Second, it would reinforce agricultural liberalization policies because farmers who can make their own decisions on crop selection and who can sell their products in markets would be willing to pay more for water. Third, if a new treaty guaranteed that a certain proportion of each country's share of Nile water would be available to be traded, it would probably be easier to reach agreement on the allocation of the long-term yield among Egypt, Sudan, and Ethiopia. For example, if a regional water market existed, a new agreement that gave Ethiopia an allocation of 12 BCM would not necessarily prevent Sudan and Egypt from expanding their irrigated acreage because both countries could purchase water from Ethiopia. Fourth, water markets could be used to assist with rationing water during times of shortage.

It is interesting to speculate about how such water markets might work and what terms of trade might result. In the immediate future, Ethiopia would have no means of withholding or using its new share of Nile water. Egypt and Sudan, of course, would know this situation and not be inclined to agree to purchase water from Ethiopia unless there were compensatory agreements in other areas or unless such a sale were required as a condition of the new Nile Waters Agreement. As Ethiopia gradually expanded its irrigated acreage, negotiations over water sales would become more complex. Unless Ethiopia used its water allocation, it would flow downstream to Sudan and then Egypt. Ethiopia could give its allocation to either country, or a portion to each country. Egypt and Sudan obviously would have an incentive to agree among themselves and offer Ethiopia a very low price for its water, but such a strategy might induce Ethiopia to simply pursue its own irrigation plans and not sell its water allocation.

Ideally, water markets would develop in which groups of farmers and other users would be able to buy and sell water rather than have central government ministries negotiating the terms of sales. Clearly, much thought and planning must go into how best to establish and regulate regional water markets, but the potential benefits to all riparians are very large, and the work needs to begin.

Water Quality Concerns

Compared with many major river systems, the Nile is remarkably unpolluted over most of its length. Thus, water quality concerns are not likely to

play a major role in future negotiations in the medium-term future. Nevertheless, a new Nile Waters Agreement does offer an opportunity to establish the principles that will be used to address future water quality management issues. For the foreseeable future, the most serious water quality problems will continue to be in the Egyptian portion of the Nile, particularly north of Cairo. These problems can be dealt with by Egyptian authorities without the involvement or cooperation of upstream riparians. There are few effluent loadings from upstream point source discharges, and they pose no immediate threat to downstream quality.

The most serious water quality problem created by an upstream riparian is the large sediment loads that result from soil erosion and deforestation in the Ethiopian highlands. A new agreement might well include a provision to assist Ethiopia in the implementation of a specific program to reduce such sediment loadings. If the Blue Nile Reservoirs are to be built, such a program would be even more clearly in Ethiopia's best interests.

Consideration of Nonwater Issues

Another important question to consider is whether building accords and understandings around more than one good—in this case, water—would enhance the stability of a new Nile Waters Agreement (Waterbury, 1992). Given the physical nature of rivers, there is generally an inherent asymmetry in the benefits that upstream and downstream riparian states can draw from cooperation. Voluntary cooperation may be impossible when some stand to gain much more than others when only dealing with a single good. Straight monetary compensation by those that benefit most from a particular development to other riparians might buy cooperation. Compensation in other goods, such as access to markets, military cooperation, and diplomatic support, might enhance even more the prospects for stable voluntary cooperation. Single-good agreements may set thresholds of compliance and noncompliance too clearly, leaving little room for maneuver and forcing one or more parties to take punitive action or to cancel the accord. Multigood arrangements with complex contingencies may allow the parties to play on more than one register. In multi-good agreements, parties can emphasize compliance with some or most areas of the accord even while failing to comply completely in another specific area.

Regimes (either formal or informal agreements) entail interdependencies. When these interdependencies involve vital resources, potential participants tend to see what they might lose rather than what they might gain. One could argue that complex interdependencies would give everyone an incentive to avoid conflict and to maintain the regime over the long run. But if one party acts "irrationally" after the interdependencies have been established, results could be catastrophic. Within and across national boundaries, the systems for

water storage, delivery, and flood control as well as bridges, power grids, and pipelines are virtually undefendable. If a multigood regime entails integration of water delivery systems, oil pipelines, and power grids, the prospects for havoc are enormous. A major reason for Nasser's advocacy of the Aswan High Dam project was to avoid this type of vulnerability, thus maximizing Egyptian control of water storage.

Egypt's strategy over the last few years has been to try to persuade all the upper Nile riparians that they would forego important opportunities for economic development if they fail to cooperate in what the Egyptians have depicted as a multigood game. The multigood bargain that Egypt is advocating does, of course, include water, but it also includes electrical energy, improved transportation in the basin, collective collateral among the riparians to raise external development assistance, provision of engineering and monitoring expertise, and improved tourism. The cooperative regime envisioned by the Egyptians is one of basin-wide development involving all domains of the riparian economies.

It is important to consider how at least one other good—electricity—might be incorporated into a new agreement. Egypt's development may be constrained more by lack of power than lack of water. The importance of the Aswan High Dam in meeting Egypt's base-load power needs has been declining ever since it was built. The dam currently supplies about 20 percent of Egypt's total power needs, which are growing by about 6 percent per year. By the year 2000, the dam may supply no more than 10 percent of national consumption. There is very little more hydropower that Egypt can generate and none at the dam itself. The point is that early in the next century the reservoir at the dam site need no longer be operated so as to maximize base-load power generation. This possibility opens up an array of choices for Egypt, including operating the Aswan High Dam Reservoir for peak load power generation and for purposes of irrigation in tandem with new storage facilities upstream.

Because of Egypt's growing demands for electricity, the Blue Nile Reservoirs may be more valuable for their hydroelectric power generation than for water regulation and storage. The potential annual hydropower generation is roughly three times as large as that of the Aswan High Dam. It is difficult to foresee when Ethiopia could use this much electricity. The most obvious markets for the electricity generated by the Blue Nile Reservoirs are in Egypt and Sudan. Thus, a mutually beneficial arrangement would appear to be possible with respect to water and power, whereby Egypt would agree to Ethiopia's water allocation and to the construction of the Blue Nile Reservoirs on the condition that a certain percentage of the electricity generated would be sold to Egypt at a specified price. Such an arrangement has the added advantage that it would create an incentive for Ethiopia to operate the Blue Nile Reservoirs to maximize hydropower generation and establish an incentive to release water on a regular basis. Also, the elimination of the Jebel Aulia Dam

proposed above would raise pumping costs for the many irrigation schemes south of the dam that are currently relying on its seasonal storage. Assurances for the sale of a fixed amount of electricity to Sudan at specified prices to compensate for these additional costs might make the negotiations more attractive for the Sudanese.

BARRIERS TO A NEW NILE WATERS AGREEMENT

Despite the long-term necessity of negotiating a new agreement, there are numerous barriers to such an accord in the near future. The first is the inability of both Sudan and Ethiopia, due to their political and economic instability, to make credible commitments to Egypt. The Egyptian government needs assurance that any concessions it makes today will be worth the domestic political price it must pay for halting or reducing its desert reclamation efforts and that Ethiopia and Sudan will not expect such concessions to be the first of many.

Second, the upstream riparians have very few people with the necessary hydrological expertise or knowledge of the history of Nile water management efforts to participate effectively in negotiations. For example, none of the upstream riparian countries has operational computer simulation models of the entire Nile Basin that they can use to examine the consequences of different management plans. Upstream riparians are thus fearful of being outnegotiated by an Egyptian team with a much better understanding of Nile Basin issues.

Third, in all of the riparian countries, Nile water issues are being handled by essentially two groups of people—water engineers and diplomats. Individuals with other perspectives and disciplinary training need to be drawn into the policy debates. For example, many individuals stand to benefit from the establishment of regional water markets, but their interests are poorly represented at present. In fact, water markets will inevitably entail a transfer of power from senior bureaucrats in national water and irrigation ministries to decentralized groups of water users. One should not be surprised to find many government officials resistant to such changes.

BREAKING THE IMPASSE: THE ROLE OF THE INTERNATIONAL COMMUNITY

The role of the international community in facilitating a new agreement is, in fact, rather modest. Nothing will happen until the riparian countries decide that the time is right to begin discussions. However, this time may not be far off. On December 23, 1991, Ethiopia and Sudan issued the Ethiopia-Sudan Peace and Friendship-Khartoum Declaration. In this declaration, Ethiopia and

Sudan agreed that they "believe in and affirm equitable entitlements to the uses of the Nile waters without causing appreciable harm to one another" and that they would seek to establish a Nile Basin organization.

The process of appraising water resources development projects in Ethiopia and of reaching international agreements on Nile water allocation will take a long time. Thus, it is not in Ethiopia's interest to delay, despite a shortage of expertise and trained personnel. Ethiopia is likely to force the issue of its appropriate allocation of Nile waters by seeking international financing of irrigation and hydroelectric projects in the Blue Nile Basin. Egypt and Sudan need to consider carefully how they will respond to such an initiative. The international donor agencies can make a positive contribution to this process by making it clear to Egypt and Sudan that they cannot block international financing of Ethiopian water resources development by simply refusing to negotiate with Ethiopia. A serious effort at compromise must be made by all parties, or international financing of Ethiopian water resources projects should proceed anyway.

A second constructive step that the international community can take is to assist in the training of the next generation of Nile water experts in the riparian countries. Part of the required strategy might be to create a master of science degree program in water resources planning and policy. A certain number of fellowships could be allotted to each riparian country to ensure that the student body is broadly representative. Part of the core curriculum could be a year-long intensive course in river basin planning, with a special emphasis on Nile River system planning. As part of their standard training, students would become familiar with the existing computer models available for Nile Basin planning. International experts in water resources systems analysis and Nile management should be attached to such a program in its early stages. One of the most valuable side benefits of such an academic program would be the creation of an informal network of individuals in the Nile Basin countries with personal relationships and shared understanding of Nile management issues.

NOTES

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1. These estimates of irrigable land are speculative, and Egypt will certainly request more information than is currently available on the economic feasibility of potential irrigation projects in Ethiopia. In turn, Ethiopia may ask for the same information concerning Egypt's proposed desert reclamation schemes.

2. Jovanovic (1985) used an even higher estimate of potential Ethiopian water withdrawals: 40 BCM. (For further discussion, see Jovanovic, 1986; Whittington, 1986.)

3. Other estimates are even higher. Recent statements by the Egyptian Minister of Public Works suggest Egypt will be using 72 BCM by the year 2000.

4. The Jonglei project is a proposed series of canals through the Sudd Swamp in southern Sudan. These canals are designed to drain water from the swamps, thereby increasing the downstream usable yield of the river. The first stage of the Jonglei project is estimated to yield 3.8 BCM of water at Aswan. The project has been stalled since 1987 due to political instability in the region. Environmental concerns also figure prominently in discussions of its resumption.

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