Workshop 1

Water Resources and International Conflict

Case Study

Environmental Stress and Conflicts in Africa: Case Studies of African International Drainage Basins

by

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ENVIRONMENTAL STRESS AND CONFLICTS IN AFRICA : CASE STUDIES OF AFRICAN INTERNATIONAL DRAINAGE BASINS

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INTRODUCTION

If one was to conduct an impression poll of twenty-year-old United States citizens today to assess their image of Africa one would probably find an overwhelming image as that of starving population and warring groups. In other words, the romantic image of Tarzan prevelent in 1960's will have been replaced by that of gloomy if also disastrous victims of perennial drought and concurrent confusion of social conflicts. The drought food scarcity and starvation are partly caused by scarce and maldistributed rainfall. The conflicts, on the other hand are caused by a variety of political and social tensions but these may be aggrevated by the coincidental socio-economic tensions wrought by the widespread poverty and squalar associated with drought.

Thus, the two salient problems of Afirca : drought, with food shortages, and conflicts are concurrent rather than bearing any causal relations. A critical factor behind the image of misery and conflict is, however, water shortage which leads to poor agricultural productivity. This issue would have been straight forward if there was a general absence of water in the continent. In point of fact, however, Africa may not be the driest continent on earth. It has a reticulation of some fifty-four drainage basins, including rivers, which either traverse territorial boundaries or forming whole or part of such boundaries but which, alone, cover on area approximately half the total area of Africa.(1) Unfortunately only approximately two percent of the total African water is utilized leaving the remaining 98 percent to replenish the oceans, which Krishnamurthy considers as a colosal under utilization requiring redress.(2)

This means that as a continent Africa will in future have to focus attention on control, apportionment and utilization of the waters of its drainage basins to ameliorate the problems wraught by scarcity of rainfall

and the consequent drought and famine. It would be expected that after the scarcity of rainfall in late 1970's and mid 1980's there would be concerted efforts in Africa to control the promising rivers and to transfer the water to centres of agriculture and human settlement. Indeed, since the quantities of the waters are finite, such measures of control, transfer and utilization would generate international tension and possibly acute conflicts. This would certainly be the case in event of concerted effort to intensify agricultural productivity through irrigation, which is the most voracious of all consumptive uses of water.

Given the gross underutilization of water in Africa todate major conflicts over international waters might be dismissed as hypothetical for the foreseeable future. But this may not be the case for long. Back in 1978 an Egyptian Minister for Irrigation was reported to have declared that Egypt would not allow Ethiopia to harness the Blue Nile for irrigation in the Ethiopian plateau, as that would diminish the volume of water reaching Aswan Dam.[3] In return Ethiopia issued tarse messages for the ensuing three weeks saying that they had all the right to exploit their natural resources and to defend that, Ethiopia would go to war.[4]

It has been argued that the only promising way of avoiding future conflicts in the utilization of waters of international drainage basins in Africa is by cooperative and systematic collaboration among the basin states in the management of such waters. In fact, a United States Congressional Committee on Foreign Affairs received the suggestion that the United States should suspend financial aid to such basin states to forces them to conclude basin agreements as a way of avoiding regional conflicts.

Before the latter notion is extended to African basin states generally this paper will examine the trends in

environmental stress associated with water resources and coinciding with actual and present social and political conflicts. Section 2 of this paper will define the concept of environment, environmental stress and the place of water within these processes. Section 3 examines three broad case studies, viz : the Nile and Lake Victoria Basins in Eastern Africa, and the problem of international basins in the region of the Southern African Development Coordinating Conference (SADCC). In every case the management practices over time are assessed for peaceful viability and sustainability.

Section 4 will lift the main factors behind persistance of present as well as future conflicts among the states of the basins. It will be argued in conclusion that basin agreements, though essential, will not, in themselves, bring about peaceful management of the basin waters. The additional necessary conditions for peaceful and sustained management of the basin waters are in section 5 of the paper. Those could be characterized as the conditions for conflict avoidance.

2. ENVIRONMENTAL MANAGEMENT AND STRESS

Understanding the concept of environment has been like the legend of the seven blind men attempting to identify an elephant : there are several interpretations. But for purposes of this paper there must be a working definition. Elsewhere we have defined the environment as the total context within which natural resources exist and interact as well as those infrastructure constructed by man to facilitate socio-economic activities.(6) A recent Working Group of the IUCN's Commission on Environmental Law (CEL) attempted a tentative definition of environment as "the totality of nature and natural resources as well as cultural heritage and infrastructures essential for socio-economic activities".(7) While agreeing with the general spirit of the former definition the majority of the Working Group opined that central to the notion of environment was nature, encampusing the earth's geosphere, bioshpere and associated processes while the concept of nature which can be used for socio-economic activities by man and other species.

Thus, the two definitions agree on the central tenets of the definition. First, that the environment is actually the natural context and not any specific resource section. Secondly, that the various resource sectors such as water, forests, minerals, energy, human beings and air are simply components of the environment. Thirdly, that the infrastructure construed to facilitate socio-economic activities, such as settlements, transport infrastructure and factories are also part of the environment. Infact, it is the latter set of components which make planners and architects part of environmental scientists.

In pristine settings the various components of the environment interact changing one another overtime in a form of ionomorphosis, thus maintaining an eternal

balance. But the human intervention through utilization of the natural resources as well as emission of effluents from socio-economic activities have changed the nature of environmental processes. In some cases, the consequence is direct degradation of the environment or its components; in other instances, the result has been depletion or even extinction of some of the natural resources or specific species. These may be generally called environmental stress.

These severe changes led to identification of the threat to the environment or its specific parts and, consequently, organizations to control the trend. Early organizations especially from the 19th Century focussed on different forms of stress on specific organisms and urged for their protection.(8) Where the species were deemed threatened, complete preservation, requiring people to desist from utilization of the given species. On the other hand, environmental movements urged people to take conservation measures which means to protect and manage the natural resources sustainably and to avoid waste of non renewable natural resources. Thus, the terms preservation and conservation are distinctly different but both are concepts in environmental management. The critical goal in environmental management is to organize the utilization of the natural resources so as to peacefully meet the present needs without jeopardizing the interest of future generations. (9)

The underlying notion of sustainable environmental utilization is the antithesis of environmental stress. It is the concept of sustainability which associates sound environmental management with development. In this context development is considered as "the process by which a country provides for its entire population all basic needs of life, such as health and nutrition; education and shelter; and to provide every one of its population with opportunities to contribute to that very process

through employment as well as scientific and technological construction. Secondly, it is the process by which the national governmental authorities construct and maintain productive mechanisms and infrastructure which diversify and perpetuate the productive base of the country, such as agriculture and industries so as to ensure that the society can overcome the pressures and necessities of the national and related economic system for the present and all future times".(10)

What makes the relationship between environmental management and development critical is that development requires sustainability in the mobilization and utilization of the natural resources. Thus, the critical concept for development is environmental conservation; without it, sustainability as an essential element in development, will be jeopardized. The images of starving Africans in the context of social and political conflicts exemplify absence of food and nutrition, safe drinking water and healthy habitats among others. Granted, the conflicts could exist in areas of plenty of water and other natural resources, but the situation is infinitely exacerbated by any maldistribution of the natural resources particularly water as has been evident in Sudan, Ethiopia, Mozambique, Angola and the entire Sahel zone.

It is for these reasons that the suggestion which emerged from 1970's that environmental exigencies are antithetical or even at war with development needs was grossly inaccurate and patently misleading. (11) Most development countries agree with the thesis of the Brundtland Report that sound environmental management is essential for development and this is reflected in a wide range of literature.

In Africa, the inextricable nexus between environmental conservation and development is particularly critical.

One of the crucial agenda for Africa's development is to mobilize the existing natural resources, particularly water to eradicate the image of the miserable and starved people and then move to systematic and sustainable development. The impetus for these efforts are not in the Bretton Wood prescriptions which have been described elsewhere as "inappropriate technology" because of its incorrect assumptions. It is the natural resources which the African countries have inherently and therefore, their" boots and bootstraps" by which they have to pull themselves with whatever external development assistance that may come. This then, is the significance of agriculture and agrobased industries for Africa and for which water would be the critical factor.

Environmental stress occurs when these natural resources and the context within which they exist is threatened either by degradation, that is erosion or reduction of quality or by depletion. Soil erosion, water pollution, depletion of surface or ground water, depletion of fishery resources, depletion of wildlife, depletion of petroleum, oil or mineral reserves and the pollution of air, among others, are sources of environmental stress. Similarly, depletion of components of the environment such as the ozone layer, not directly used, also creates environmental stress. But the stress on water resources creates a particularly acute problem because water provides life to plant and animal life alike and it is the basis of agriculture and food production which are currently associated with the deplorable conditions exacerbation of conflicts in Africa. And this is why we have to look to Africa's drainage basins where most of the unused waters still exist.

3. CASE STUDIES OF AFRICA'S DRAINAGE BASINS

Introduction

Two problems, drought and consequent famine on the one hand, and on the other, rising costs of imported hydrocarbons for energy have been associated with Africa's development problems during the past two decades. Both of them have focussed attention of some students of development on African rivers because the rivers carry water and they are capable of yielding hydroelectric power.

On the water Krishnamurthy, who worked for the U.N. Economic Commission for Africa has offered the following data :

> "Estimates of Africa's total water resources vary from 3,400 billion m^3 of water to 4,600 billion m^3. An analysis of the measured streamflow in African rivers indicates that the total quantity of surface water in Africa's rivers and lakes is in the order of 2,480 billion m^3, the difference between this and the aforementioned estimates being a measure of ground water resources. More than 50 percent of the total water resources of the continent are in one single basin, Congo/Zaire (1,325 billion) and another 25 percent in seven other river basins such as Niger (200 billion), the Ogooue (149 billion in Gabon), the Zambezi (104 billion at C. Ana), the Nile (84 billion) the Sanage (Cameroon, 165 billion), the Chari-Logone (Chad, 43 billion) and the Volta (40 billion).[14]

This is the primary example of the poor distribution of

Africa' available waters. There are several other major international rivers such as the Senegal and Limpopo which also flow through areas susceptible to drought and famine. All these waters could be controlled and transferred for agricultural production.

The hydroelectric potentials of Africa's rivers are also reported to be vast but largely untapped. Again Krishnamurthy reports that approximately of the world's potential hydroelectric power is in Africa.[15] He adds that despite the high potential, the installed capacity of hydropower in Africa is only 5.6 percent of the total and that the ratio of energy generation to the exploitable potential is only 2 per cent. Therefore, there is considerable reserve of renewable energy which African states might harness and utilize instead of the expensive imported hydrocarbon.

Water and power may be relatively abundant but these would not facilitate agriculture unless adequate land is available. A report by Prof. L.A. Odero-Ogwell Secretary to the World Food Council, in 1982 said that Africa's agricultural land is still plenty and compares favourably with the other regions of Asia and Latin America, as shown in Table 1 below :

Table 1

Region	Potentially cultivable (m ha)	Presently cultivated arable area (m ha)	Presently cultivated %	Average period (yrs)
Africa	803.7	193.7	24	3
Southwest Asia	46.0	50.9	110	2
Southeast Asia	324.8	270.5	83	3
South America	814.9	85.2	10	4

If both water, land (and renewable source of energy) are available then the constraint to agriculture, leading to the widespread and perennial famine must lie elsewhere. Professor Odero-Ogwell points to the failure of African countries to adopt technological packages, particularly irrigation as the main bottleneck.(16) One illustration of this contention is that by 1977 only 1.8 per cent of the cultivated land was irrigated, compared to 28 percent in Asia and 6.2 percent in Latin America. Evidently, if Africa is to improve its agricultural productivity especially in the countries with perennial drought and famine, as in Ethiopia, Somalia, Sudan, Mozambique and the Sahel region generally, then there must be more concerted control of river flows, and transfer of water to irrigated fields.

Both irrigation and hydropower production require control of the river by damming and this leads to a change in the flow regime. But while hydro-power generation allows for restoration of the flow regime after the dam fills abstraction of the basin waters for irrigation reduces or diminishes the quantities flowing downstream. Both instances may lead to conflicts with the case of irrigation being more severe.(17) And this should call to mind the exchange between Egypt and Ethiopia referred to earlier.

There is a need for basin states to create a forum at which every state intending to construct works which might change the flow regime of an international river or diminish the quantity of basin waters should inform other basin states. But a forum for consultation, functioning only as a mediator is inadequate due to its generically ad hoc character which allows broad and independent planning. What is desirable is a framework for integrated, multi-objective basin-wide planning. This facilitates "a mixture of activities producing marketable goods (electrical energy, agricultural products, industrial

goods, transportation services etc) and essentially non-marketable services for which public funds are required (flood control, environmental protection, improved health and security against drought and famine)"[18] The size or cost of the specific development works is a different issue and informed commentators agree that it is possible to create an institutional and operational arrangement which is sensitive to the exigencies of cost and environmental protection.[19]

There is, therefore first clear rationale for African countries to mobilize the waters of their drainage basins for irrigation, safe water supply, navigation, fisheries development, flood control and environmental protection. Secondly, there is a necessity for the basin states to arrange integrated and multipurpose basin management within an institutional frame work. Such a framework would provide a forum for information exchange, consultation, resolution of possible conflicts and the integrated and comprehensive management of the basin and its resources.

The question next is have the African countries ignored the comprehensive and intergrated management approach? Where such precepts have been recognized and agreements concluded what has happened in terms of peaceful implementation?

Three case studies have been selected and assessed here-below.

The African Drainage Basins

There are fifty four international drainage basins in Africa cosntituting a complex and widespread reticulation of water bodies. Among them are the historically well-known rivers such as the Nile, Congo/Zaire, Senegal,

Niger, Limpopo and Zambezi, among others. All these were significant in history either because they were used for demarcation of colonial spheres of influence or for navigation and colonial penetration of Africa. Only in the case of the Nile was the river known also for irrigation which provided the life line for the ancient hydraulic civilization. We have also seen that the quantities of water discharged to day by these rivers into the oceans is colossal, only corresponding in magnitude to the widespread drought and hunger in the continent.

Africa is also known for the rampant and acute conflicts. But rarely have these conflicts linked directly to use of water resources. The problem, however, is that there are a number actual or planned water use programmes which may lead to direct acute conflicts. In the alternative, given the fact that widespread drought and famines may lead to increased water use such trends may infact, exacerbate existing low-level conflicts and violence and lead to acute conflicts.

In this section three case studies will be reviewed. The first one is the River Nile. But that river is inextricably tied and related to Lake Victoria and the Kagera River. Thus, it would be incomplete to examine the Nile, or even with Lake Victoria and to isolate the Kagera Basin. The second case will be the Senagal. Thirdly, we shall look at the web of drainage basins in the SADCC area where the presence and plans of South Africa create a series of situations of possible conflict.

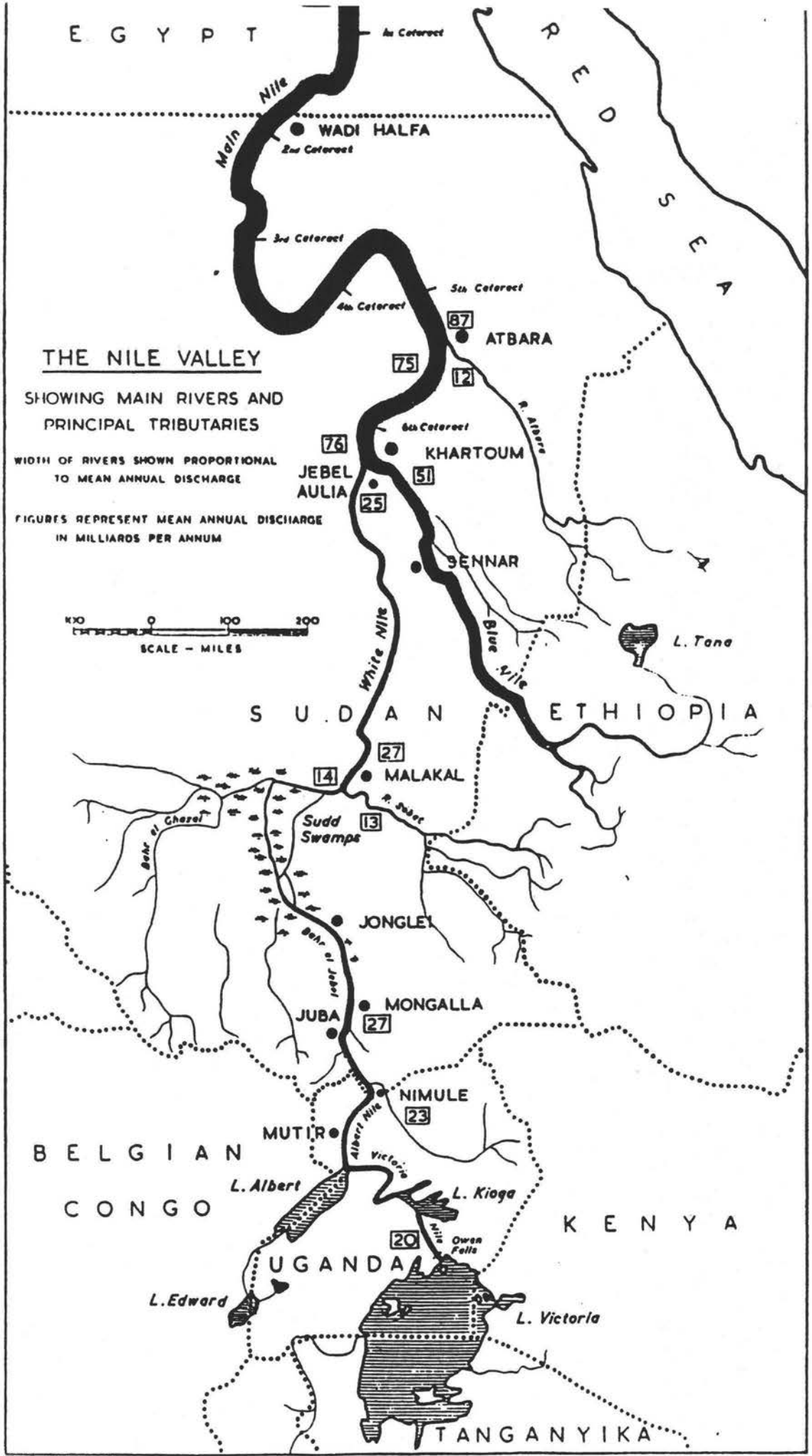
In each case the discussions will give a brief description of the physical features of the basin, the sources of various volumes of water and the general characteristics of the riparian or basin states. Finally, the discussions will examine two activities that are likely to interfere with the rate and amount of water reaching the lower

riparians. For this, there are two major activities, namely : Irrigation, which as a major consumptive use, diminishes the quantities downstream, and damming for hydroelectric power generation which may alter the flow regime but rarely diminishing the ultimate quantities.

(a) The Nile, Lake Victoria and Kagera

The Nile is the second longest river in the world, after the Mississippi while Lake Victoria is the second largest fresh water lake in the world, after Lake Superior (assuming that the waters of the latter can still be considered fresh). Both basins are bordered in different degrees by nine states, namely : Burundi, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda and Zaire. The status of Rwanda and Burundi is unique in that they are brought into the basin by virtue of the Kagera River which drains into Lake Victoria. The entire basin area is estimated at 2.9 million square kilometres which represents approximately one tenth of the African continent.

Lake Victoria sits on the eastern African plateau at an elevation of 900 metres, surrounded by relatively low-lying land averaging 1,100 metres around its shores. (20) Total area of the lake is approximately 68,800 square kilometres, of which the Kenyan share is about ten per cent, Ugandan, forty per cent and Tanzanian, fifty per cent. (21) Surface water contributed by rivers comes entirely from Kenya and Tanzania. The main rivers from Kenya are the Kuja, Awach or Kibuon, Miriu, Nyando, Yala, Nzoia and Sio, and Tanzanian and Mara, which crosses into Kenya, and the Kagera on the southern side, respectively. The Kagera River is significant because it drains the territories of Rwanda and Burundi as well, a fact that has made it a subject of a special international basin commission comprising the four governments, (22) and also


EGYPT
RED SEA
1st Cataract
Main Nile
WADI HALFA
2nd Cataract
3rd Cataract
4th Cataract
5th Cataract
87
ATBARA
75
12
R. Atbara
6th Cataract
76
KHARTOUM
JEBEL AULIA
51
25
SENNAR
THE NILE VALLEY
SHOWING MAIN RIVERS AND PRINCIPAL TRIBUTARIES
WIDTH OF RIVERS SHOWN PROPORTIONAL TO MEAN ANNUAL DISCHARGE
FIGURES REPRESENT MEAN ANNUAL DISCHARGE IN MILLIARDS PER ANNUM
100 0 100 200
SCALE – MILES
White Nile
Blue Nile
L. Tana
SUDAN
ETHIOPIA
27
14
MALAKAL
R. Sobat
Bahr el Ghazel
Sudd Swamps
13
JONGLEI
Bahr el Jebel
JUBA
MONGALLA
27
NIMULE
23
MUTIR
Albert Nile
Victoria Nile
BELGIAN CONGO
L. Albert
L. Kioga
KENYA
20
Owen Falls
UGANDA
L. Edward
L. Victoria
TANGANYIKA

because it extends the limits of the Nile Basin farther to the southwes..

Linked to the lake in Uganda is the Nile as the only drainage outlet from Lake Victoria. Here, at the Ugandan industrial town of Jinja, the exit discharge passes through the Owen Falls dam, commissioned in 1954, to provide water security for Egypt and to produce hydro-electric power from Uganda. After construction of the dam, realiable estimates of the exit discharge from Lake Victoria have indicated that releases through the turbines which generate electricity and releases through the sluices total a discharge downstream conforming to the 'natural regime of the river at Jinja'.[23] This is the way the system is supposed to work, and the term natural regime here means the same rate at which water flowed out of Lake Victoria before the dam was built.

The Victoria stretch of the Nile flows from Jinja to Lake Kyoga; between Lake Kyoga and Lake Mobutu (formerly Lake Albert), it is the Kyoga Nile. It exists from this lake on the northern toe as the Albert Nile, and is the only outlet from that lake. It is at Lake Albert (Mobutu) that Zaire, as a basin state of the Nile, makes it contact through the River Semiliki which, flowing from Zaire, enters the lake at its southern toe. From Mobutu to Malakal in Sudan, the river is known as Bar el Jebel, part of the White Nile. This is the area of the well known Sudd of Southern Sudan, where much water is lost through evaporation and soakage : it is this abundance of water lost through evaporation and necessitated the construction of the Jonglei Canal.[24] Beyond Malakal, the White Nile flows directly northwards up to Khartoum where it is joined by the Blue Nile, which drains Lake Tsana in the Ethiopian highlands. Then farther north it is again joined by the Atbara also flowing from the Ethiopian highlands. It makes one gentle loop southward, then northward, crossing the border as Wadi Halfa into

Egypt,, where it is ushered gently to its full length, estimated at about 4,180 miles from Jinja exit.(25)

For purposes of international legal and policy perspectives of the Nile basin, there are further geographical-cum-hydrological facts that should be examined. The volume of water each of the riparian contributes to the Nile might be taken into account in the decision of how much water a riparian might properly divert for its national use. In terms of proportions, Gamal Moursi Bard of Egypt estimates that, of the total annual Nile discharge, 84 per cent is contributed by Ethiopia and only 16 per cent comes from the 'Lake Plateau of Central Africa'.(26) Garretson, however, offers the estimate that at the peak of its flood (April - September), the Blue Nile alone supplies 90 per cent of the water passing through Khartoum, but that in the low season (JanuaryMarch) it provides only 20 per cent.(27) A broad estimate would be that the Lake Plateau of Central Africa contributes between 20 and 25 per cent of the water flowing north of Khartoum, while 75 to 80 per cent is contributed by Ethiopia.

To Egypt, a lower riparian dependent on Nile waters for its survival, the contribution from Lake Victoria on an annual basis must be minute, compared to that for Ethiopia. However, the Lake Plateau water supply is reliably steady throughout the year because of the storage at Owen Falls Dam. One commentator has noted that it was because of the annual flooding, due to the Ethiopian contribution, that Egypt decided to construct the High Dam at Aswan to regulate the flow and provide over-year storage for Egypt, rather than depend on the remote reservoirs of Lake Tsana and the Central African lakes.(28)

The source further points out as well that Sudan has preferred regulation of the flow of Nile waters by a series of smaller dams rather than the Aswan model which would, in any case, only assure steady supply to Egypt and

not to Sudan, and also where the reservoir would extend into Sudan to flood the town of Wadi Halfa. Besides the flow control, the dam was to be used for generation of 10,000,000 KWH of hydroelectric power. Egyptian interests prevailed, and the dam was constructed between 1961 - 64. The degree of regulation of flow to meet year-round irrigation needs which has been accomplished in fact by the Aswan Dam needs to be ascertained, because it may have a bearing on Egypt's dependence on the waters of Central African lakes at present. Also, the volume flowing out of Ethiopia is highly susceptile to variation, depending on that nation's plan for future development.

The Sudan contributes no water to the Nile and in addition to what it consumes for irrigation, there is volume lost through evaporation and in the Sudd. Apart from precipitation, only the southern and eastern parts of the Lake Victoria basin contribute to the waters of the lake . The lake's contribution to the Nile is easily determined by measuring the total discharge at Owen Falls Dam. For purposes of policy in Kenya and Tanzania, the exact proportion of the annual outflow at Owen Falls Dam which is contributed by each country, separately, needs to be established. This line of analysis should use percentage of volume contributed rather than absolute quantity or volume, because when an upper riparian diverts water from an international basin flowing through its territory, the fear of deprivation of injury expressed by a lower riparian is clearest when expressed in terms of proportions.

The final question to be considered here is whether the Lake Victoria and River Nile systems constitute one basin. A drainage basin has been defined as 'The entire area, known as the watershed, that contributes water, both surface and underground, to the principal river, stream or lake or other common terminus'.[29] While the Nile and its tributaries flow directly into the Mediterranean

Sea, Lake Victoria drains directly into the Nile, thus contributing water to that one terminus. Therefore, for the purposes of this paper, the Lake Victoria basin and the Nile basin constitute one drainage system with three parts. Regulation of flow through Owen Falls makes for some semi-autonomy for Lake Victoria's basin which could be managed as a subpart, but it can be argued that hydrologically, a basin may be dammed where it is most convenient. This may explain why the countries around Lake Victoria, especially Kenya and Tanzania, might have unique clusters of interest in the lake which would could be poised against those of the lower riparians, Sudan and Egypt, in any attempt to work out an up-to-date legal regime for the Victoria and Nile waters. Similar, it is for these reasons that the Kagera can be legitimately considered a drainage basin since it constitutes a principal river. If there is any kind of conflict it should occur between two or more of the nine basin states.

Pressure Points in the Nile - Victoria-Kagera Basins

Pressure points may be understood as the place or the issue where environmental stress occurs. Simply stated in this context, environmental stress means the degree of use of the water resources which diminishes the quantity or is likely to adversely affect the quality and the construction works which may change the flow regime and therefore causes flooding or alters the seasonal flow of the waters.

The following may be identified as activities causing environmental stress within these basins, as may be identified at different pressure points :

I Irrigated agriculture
II Damming for hydroelectric power

Irrigated Agriculture

The question of irrigated agriculture in these basins creating environmental stress, revolves around Egypt. For more than 7000 years Egypt has enjoyed the uninterrupted use of the Nile for irrigation. According to one commentator, irrigation is vital to Egypt, where no food or economic crops can be grown except under irrigation, and essential to the agricultural economy of the Sudan.(30) Until very recently, irrigation was much less important for the other seven riparian. For Egypt the study done for the British Government recounted irrigation needs in Egypt with the following illustrative figures :

> "Cultivated areas in Egypt amount to 6,150,000 acres (1955), the Egyptians maintain that given water, the area could be extended to 15,000,000 acres. Irrigated cultivated areas in Sudan amount to about 1,400,000 acres (exclusive of basin irrigation); further 5,500,000 acres have been surveyed and could produce crops under irrigation. This total area of irrigation would require water in excess of the amount available in the Nile system, even when all conservation works are in operation".(31)

Reports ten years later showed a general trend in the area under irrigation and the corresponding amount of water essential for the irrigation.(32)

Water year	Irrigated croped area (feddans)	Total discharge downstream the High Dam (Milliard M^3)
1968/69	10,740,063	53.116
69/70	10,732,061	54.852
70/71	10,747,096	55.364
71/72	10,742,512	55.955
72/73	10,863,000	55.285
73/74	10,976,000	56.295
74/75	11,333,172	56.245

Commentaries on this table point out that relative to the cultivated areas too much water was being released at Aswan Dam, which suggests inefficient usage of water.

Egypt vs. Ethiopia : All above waters originate from the Ethiopian highlands, through the Blue Nile and the Atbara as well as from the White Nile, particularly Lake Victoria. Ironically, there is today, no agreement between Egypt and Ethiopia or Egypt and the Lake Victoria basin states to secure commitment on the waters reaching Egypt.(33) About 85 percent of the water flowing down the Nile passed Khartoum originates from Ethiopian highlands, via the Blue Nile. Most of the rest comes from Lake Victoria which is also a stable, year round source of water. This is in contradistinction to the Blue Nile volume which comes down over a short peak period from April to September.

Yet Egypt seems to have taken the water for granted asserting that any measures to utilize the water for irrigation would be unacceptable, thus creating a leading pressure point. According to an Egyptian newspaper report.

> "Egypt and Sudan were studying with great interest feasibility studies being conducted by the USSR around Lake Tsana, where about 85 per cent of the Nile water originates. Egypt will not allow the exploitation of the Nile Waters for political goals, will not tolerate any pressure being brought to bear on it, on formenting any disputes between itself and its neighbours"(34)

In response, the Ethiopian Government issued a series of non-conciliatory statements emphasizing that "Ethiopia had all the right to exploit has natural resources. They added that Egypt went ahead and built Aswan Dam which was to depend on security of water from the Blue Nile" without even consulting Ethiopia"(35) But those firm statements from Ethiopiea didnot deter Egypt in their rather supercilious attitude. On June 6th 1980 while addressing the Second and Third Army officers, the then President Anwar Sadat asked his officers to be ready to fight Ethiopia should the latter interfere with the flow of the Blue Nile. He said to the soldiers.

> "If Ethiopia undertakes any action that will affect our full rights to the Nile waters, there is no alternative to the use of force... we will retaliate when something happens but we have to be ready with plans and alternatives to firmly stop any such action".(36)

Clearly this is evidence of an acute conflict especially when expressed directly to soldiers. Possibly, it could be considered as a passing political thought if such a

statement was not backed at the technical level by experts. But a similar call was expressed a decade later by a prominent scholar turned diplomat in Professor Boutrus Ghali, Egypt's Minister of State for Foreign Affairs who is reported to have declared that "The next War in our region will be over the waters of the Nile, not politics".(37)

These statements are in a way come as confusing signals. Ethiopian leader made an official visit to Cairo in April 1987 and at the end himself and the Egyptian President issued a joint communique in which the first substantive paragraph "reaffirmed the strong political will of the two governments and two peoples to enhance bilateral relations" adding

> They agreed that as Egypt and Ethiopia are part of the Nile Basin countries, special emphasis must be accorded to the promotion of cooperation and, in particular, in the field of the rational utilization of the waters of the Nile to the benefit of their two peoples and all the people of the area.(38)

It may well be that Egypt is nervous about its future capacity to feed its increasing population and that the security over water is threatened. But two points are not yet clear. First, once the goodwill is expressed as in the above communique, why has it not been followed up with friendly negotiations rather than the call for war? Secondly, Ethiopia has been unable to feed its own population due to droughts causing crop failure (not to

disregard the perennial civil strifes). How extensive are its irrigation plans which seem to provoke the Egyptians to nearly irrational contemplation of a war? Are the programmes for irrigation so vast that once started, no water will flow down the Blue Nile.

The questions seem to engage considerable international interest. In a recent which appeared in The Sunday Star Review in South Africa, Alistair Matheson reported that the Italy had actually designated Alessandro Palmieri as the project engineer to commence the first phase of the project.(39) Palmieri's view was that while the dams will eliminate the area's dependence on the seasonal and erratic rainfall it will hardly affect the Nile. In his view, the dam and associated irrigation works would affect only two percent of Blue Nile's annual discharge.

The original studies which proposed the full works and possible irrigation were done by The United States Bureau of Reclamation in 1964, when the United States Government were close allies with Ethiopia. Scholars who have studied the Bureau's reports have observed as follows:

> "The Bureau concluded that there are no lands along the Blue Nile which can be irrigated; the proposed irrigation schemes are located primarily in the plateau valleys at elevations between 335 and 920m chiefly (1) around Lake Tana, (2) on the Sudanese-Ethiopian border, and (3) on the agar and Finisha tributaries.... The total area of the proposed projects would be about 434,000 ha (about 17 percent of the current irrigated area of

> Egypt) with an annual water requirement of roughly 6 billion (10) M^3" (40)

The figure for the irrigable area agrees with one released by the Goverment of Ethiopia in 1969 when it stated that:

> "Out of the land area of the Abbay basin, only 903,000 hectares of land are found to be arable. Of this arable land 434,000 ha are irrigable and planned for future agricultural development". (41)

These reports suggest that there may be additional irrigable areas in other basins. For instance, it is pointed out that while the Diddessa River, a tributary of the Abbay River drains 34,000 square kilometres, its waters could irrigate about 53,000 hectares of virgin land.

It is this range of possible usages that seem to upset Egypt and provoke their war songs. But surely, it is not to be assumed that Egypt intends Ethiopia to completely desist from using the water for any irrigation. Ethiopia has been the subject of rather demeaning worldwide campaigns for food to feed its people. Evidently it should turn to the natural resources on its territory especially water for irrigated agriculture for food production. The critical question is under the planned projects would Ethiopia consume all the Blue Nile water? Guariso and Whittington have examined this point in detail and find no conflict between Ethiopian interest vis viz that of Sudan and Egypt. They argue that even if the plans of the Bureau of Reclamation were fully

implemented (6 billion m^3 of water used in Ethiopia) Egypt and Sudan would still benefit from construction of the reservoir; losses of constraints in the systems would only entail a total reduction of 2.4 billion m^3 to Sudan and Egypt with respect to the maximum potential they could allain".(42)

In the end, Guariso and Whittington draw five conclusions of which three are relevant to this discussion :

> "1 . Full development of the Blue Nile in Ethiopia would effectively end the annual Nile flood.
>
> 2. If Ethiopia were to develop the Blue Nile basin, the amount of water available for agricultural use in Egypt and Sudan would actually increase, because the river could be more easily regulated downstream, thus reducing storage requirements in Sudan and evaporation losses from the Aswan High Dam Reservoir.
>
> 3. There is little, if any, conflict between the riparian states on the broad policy of how such reservoirs in Ethiopia should be operated".(43)

In view of the war songs once sounded by the late President Sadat and Professor Boutros Ghali one must wonder if Egypt does not have the information in the analysis by Guariso and Whittington. Why then would they sound the war alarms, the highest level of conflict before holding detailed discussions with Ethiopia? Possibly, Egypt has taken the Nile waters for granted and desires status quo despite the wrable drought and food shortages in Ethiopia.

Irrigation in Kenya

Kenya is basically an agricultural country even though irrigation has not played the central role in the economy. But if Kenya was to embark on major irrigated agriculture, water would not be an overwhelming problem. It has one-tenth of Lake Victoria's 68,000 square kilometres as part of its territory. Besides, there are seven major rivers: Kuja, Awach-Kibuon, Oluch, Miriu, Nyando, Nzoia and Yala flowing into the Lake throughout the year.

Of all the East African countries, Kenya contributes the largest volume of water into Lake Victoria via the rivers listed above. It is estimated that the rivers contribute approximately 7,000 million cubic metres of water into the lake annually, and that this constitutes about 35-40 percent of the total water reaching Lake Victoria.(44) This is a significant contribution to the storage head for which the Egyptian government agreed with the British colonial government to construct Owen Falls to facilitate year round control and storage especially during the floods from the Blue Nile from April to September. For these reasons, Egypt might be about the quantities of water flowing into Lake Victoria from Kenya. Thus, in a recent interview with senior Egyptian authorities in Cairo, Tony Walker was told : "The day that Kenya decides to use water of Lake Victoria we'll have less water in Egypt. One litre of water used for their irrigation will be deducted from water received in Cairo". (45)

This position is clearly an exageration but it is a pointer to the fact that Egypt would be nervous about any massive irrigation scheme in Kenya. As pointed out earlier the early plans for the use of the Lake Victoria and Nile waters made no allowance at all for any irrigation in the upper basin states including Kenya. Now, the above exageration notwithstanding Kenya has several planned and actual irrigation works within the

basins of the contributing rivers and within the Lake Victoria Basin. This is one of the most important tasks allocated to the Lake Basin Development Authority (LBDA) created by an Act of Parliament in 1979.

If the utilization of water in Kenya would concern Egypt at all then the planned irrigation within the LBDA area would worry Egypt as an environmental stress. The LBDA has conceived two broad categories of irrigated agriculture. First, it plans what is called Lake Shore Irrigation Schemes, confined to within 20 kilometres of the lake's shore. The shore area is approximately 157,000 hectares of which 77,900 hectares are in the southern shores while 79,400 hectares are in the northern shores of the lake. (46)

That is not all. The LBDA has surveyed the catchment areas of the various major rivers flowing into Lake Victoria. Such irrigable areas total 200,000 hectares, broken down as below: (47)

Estimated Irrigation Potential by river basins

River	Location Area	Irrigable ha
Nzoia	Middle/Lower	65,000
Yala	Yala Swamp	15,000
Sondu/Miriu/Kibos	Kano Plains	60,000
Kuja/Migori	Lower	25,000
Mara	Upper	20,000
Others	Various	15,000
TOTAL		200,000

The corresponding volumes of water to irrigate these areas have not been determined. But the figures illustrate the direction of planned irrigation. It is also significant to emphasize that irrigation is likely to assume more prominent in Kenya with the increasing food demand. The population of Kenya is growing fast -

approximately 4 per cent per annum. Yet the agricultural production under rainfed conditions is limited. About two thirds of the entire country is classified as arid or semi-arid, requiring irrigation for agricultural productivity. Already there is a study establishing feasibility of inter-basin transfer from River Nzoia to the Kerio Valley to facilitate irrigation of the semi-desert area of Kenya.(48)

Apart from the planned irrigation within the Lake Victoria Basin, a number of irrigation Schemes already exist with the large one being under the National Irrigation Board. They are at Ahero - 1,348 ha, West Kano - 1,228 ha, Bunyala 213 ha and Yala Swamp where only the latter one is under the LBDA, to reclaim the swamp and to irrigate over 2,000ha.

Kenyans already know the value of irrigation and have drawn on experience outside the Lake Basin, including Mwea, Hola, Perkerra and Bura Irrigation Schemes. Besides, there are a number of irrigation schemes initiated and managed by the Provincial Irrigation Units (PIUs). Within the Lake Basin alone the PIS irrigation total 3,391 ha. Recently Members of Parliament supported the plan of Ministry of Agriculture to bring an additional 9,900 hectares under new irrigation schemes.(49) How these areas will be distributed has not been specified but it would be expected that some would fall within the catchment of Lake Victoria Basin.

These initiatives in Kenya are occasioned by the erratic climatic changes. They may make Egypt nervous, but there is nothing in policy or law to stop Kenya from the essential alternatives for ensuring agricultural productivity. But the stress wrought by these irrigation activities create local pressure points.

Tanzanian Irrigation Initiatives

The irrigation initiatives of Tanzania within the Lake Victoria Basin, especially using the waters of the rivers or the lake itself have not enjoyed publicity. Only two cases are known : The first would be within the Kagera basin, to be discussed later; the second one was for irrigation of the Vembere Plateau in central Tanzania, which is discussed here.

Not much has been hear of the Vembere Plateau project lately. But it was a curious and disquieting issue prompting H.E. Hurst, a senior officer of Egyptian Ministry of Works in 1926 to ascertain if there was indeed a major irrigation work planned for Lake Victoria waters.

Hurst recounted the plan as follows :

> "I found that the Germans had, before 1914 - 1918 Was a project to take water from Smith Sound, a long inlet at the South end of Lake Victoria, over a low country which seperates the lake from the land sloping down towards Lake Eyassi. The water would have been used to irrigate Vembere Steppe for the growing of cotton. The scheme which was not a government one, was to start on a small scale with a dam at Manyonga River to store its flood water and irrigate a small experimental area. From this pilot project data would be built on the Manyonga, and hydroelectric station at the dam would supply power to pump water from Lake Victoria. After passing through the turbines the water would irrigate land lower

down and finally drain into
Lake Eyassi".(50)

The total area to be irrigated in this project was 230,000 hectares but the precise volume of water to be used was not yet determined. Rene Dumont, a critical observer proposed that the project should be activated towards the end of this century and to be commenced early next century. (51)

Two things are important on this project. First, that a critical observers have found it worth pursuing before the end of this century (less than fifteen years now) suggest it as a worthwhile and feasible project. Second, the fact that a rumour about the project prompted Hurst to travel from Cairo, by sea and then up-country to establish the facts shows the seriousness with which Egypt might view the project. That is also a stress on the water resources rendering the Smith Sound a pressure point. The unanswered question remains : Is Tanzania contemplating the implementation of the project? That information is not available to this author

The Kagera Basin(52)

The Kagera basin covers approximately 59,800 square kilometres of Burundi, Rwanda, Tanzania and Uganda. It contributes approximately 25 percent of the annual discharge into Lake Victoria, averaging 184 million cubic metres per second at Kyaka. Approximately 85 percent of that volume flows from the Nyabarongo and Akanyaru rivers from western and southern Rwanda, The rest flows from Burundi, which suggests that most of the rainfall in the region is in Rwanda.

The economy of the entire Kagera basin depends largely on agriculture. But the preliminary studies by the Kagera

Basin Organization (KBO) established by the riparian states in 1977 is not optimistic about large scale irrigation works.(53) They warned that much of the Kagera River Basin agricultural is not economically suited for irrigation either because of poor soil, slope, distance and elevation differences to the dependable water supplies.(54)

The basin states have therefore resolved not to depend on irrigation for agricultural productivity but as a supplement to rainfed agriculture. Thus, initially seven areas were selected and identified for irrigation but in the end, only three areas : Bugesera in Rwanda, Rusumo Covette in Burundi and Kyaka/Kakono in Tanzania. This is only 6500 ha as compared to the original 16,800 which was identified in the earlier plans.(55)

Of special interest here is the range of Uganda projects. Uganda is one of the two lowest riparians, alongside with Tanzania. But Uganda has of late been locked in rather acrimonious exchanges with Rwanda which accuses it of supporting guerilla invasion of Rwanda. Although Uganda has denied these allegations repeatedly it remains a sore point between countries which are expected to cooperate in a basin development. Moreover, Rwanda as an upper riparian which is also the source of most of the Kagera waters, could play mischief by excessive barragement and possibly expand irrigation so as to diminish the quantities of water reaching the lower riparian.

In this case, three factors may mitigate the situation for Uganda. First, it has been observed that soil type as well as the slopes in Rwanda are not suitable for widespread irrigation. Rwanda would have to find other things to do with the water. Secondly in the profile of Uganda's planned projects under the KBO projects irrigation is not prominent.(56) Apart from a rice scheme,

Uganda opted for the intensification of rainfed agriculture. Thirdly, it seems, in these preliminary stages, that most of the projects identified under teh aegis of the KBO might have to be financed through individual country initiatives. The KBO efforts as a collective, including through donor conferences, has not attracted much money.

Therefore, under the present circumstances the KBO might still lack the cohession which could be threatened. Nor yet does it appear that there is any impending widespread consumptive utilization which could diminish the Kagera's contribution of water into the Lake Victoria. What is likely to happen is a state of paralysis where no major combined development work occurs within the basin while Uganda and Rwanda exchange their charges in matters totally unrelated to the utilization of the Kagera waters.

An additional factor likely to impede the combined work among the basin states is the subtle intervention of Zaire's Mobutu Sese Seko who considers Rwanda and Burundi as historical allies who should closely associate with Zaire rather than with Uganda and Tanzania to the east. But other than the historical solidarity and identity Zaire has very little to offer in competetion with the eastern transport and communication network which currently link them to the commercial world through the Indian Ocean. Thus, again Mobutu can only forment disorders in Burundi and Rwanda in ways totally unrelated to the Kagera waters. In the process the disorders will impeded management of these water resources. These trends will, however, keep Egypt happy in the knowledge that the flow of the Kagera into the Lake Victoria storage was uninterrupted.

The Nile in Sudan

This section seeks to outline the position of Sudan vis

a vis the Nile water controls in favour of Egypt and how they might evince some environmental stress. Ordinarily, Sudan may be asssumed to be a sister-state to Egypt for social and historical reasons. However, when it comes to the questions of apportionment of Nile waters the two states have maintained rather uneasy coexistence. The sources of the irritation were historical and do not apply today. For instance, Egypt insisted that any dam construction had to be so as to protect her interests, even if the dam was on the Sudanese territory. Such was the case with Sennar and Jebel Aulia the only major dams constructed during the Condominuim Government (The AngloEgyptian Sudan) Moreover, Sudan objected to the construction of High Aswan Dam but its position was ignored by Egypt. The result was that when full the dam inundated Wadi Halfa region displacing about 70,000 inhabitants.

Even though Egypt and Sudan were partners in drought, Egypt ignored Sudan's interests while drawing terms of reference for an international commission constituted to recommend the appointment of the existing and additional (new) waters. The Commission's report in 1926 only discussed the immediate water requirements of Sudan but concentrated on the ultimate needs of Egypt. The report of the Commission were appended to the 1929 agreement thereby rendering the treaty inequitous.

The Jonglei Canal is the one project which might test the long-term relation between Egypt and Sudan. The purpose of the project is to build a canal from Jonglei to Malakal, to make the Nile water by-pass the Sudd area of Southern Sudan. In an area approximately 67,900 square kilometres the Sudd Swamp soak up the water and with the desert heat more than fifty percent of the water is lost in evaporation. Paul Howell and his colleagues have assembled the data in Table since 1905.

Period	at Mongalla	at tail of Swamps	% Loss
1905 - 60	26.8	14.2	47
1905 - 80	33.0	16.1	51.2
1961 - 80	50.3	21.4	57.5

Table Mean annual discharges in Km^3

The primary beneficiary of the Canal is Egypt, which is slated to receive the additional water saved by the Canal from evaporation in the Sudd. For Sudan, the benefits were expected in new dryland suitable for agriculture as well as grazing grounds. But the agricultural experiments have yielded poor results. The sorghum yields were poor, maize yields are poorer still and rice yields were not encouraging either.(59) Experiments with pastures for livestock were commenced in the first phase of the Canal but that was interrupted by civil war between the Sudan Peoples Liberation Army (SPLA) and the Khartoum based Government.(60) Also halted were projects on fisheries, forestry and water development. But full funding was already available from Egypt and the European community.

It was the intensification of the civil war that halted the construction of the Jonglei Canal. The work which started in 1978 attracted large populations of workers including the French company which had undertaken the task. They had done 240 kilometres out of approximate total of 400 kilometres.(61) The engineers and other workmen became targets of SPLA attack and in November 1983 the work was halted.

The conflict in the form of civil war, which halted the construction of the Jonglei Canal was not caused by the water works. Nor yet was it an international conflict of the kind we have discussed above. It is the kind of civil war which is frequent within states. The significance of this case is that with the increasingly erratic weather and rainfall conditions there will be a necessity for various forms of water works for irrigation or reclamation of arid or wet lands. Numerous as the internal but acute conflicts are, The Jonglei kind of situation may still be witnessed elsewhere. Furthermore, the very fact that such conflicts may impede water works to facilitate increased food production may result in further instability and aggrevated conflicts.

II Damming for Hydroelectric Power

Most of the dams for water storage are multipurpose, covering inter alia, irrigation, hydroelectric power generation, fisheries, and flood control. But here, having discussed irrigated agriculture, the discussion focuses on dams for hydropower. Dams on teh large rivers are invariably large and discharges are preferred for the action on the power generating turbines.

Not all border dams have agenda for inter-state conflicts. For instance, the High Aswan Dam displaced 70,000 inhabitants on the Sudan side, as a result of innundation caused by back water effect. A solution was simply found in their resettlement. Similarly, the planned dam at Rusumo considered a number of alternative elevations and the contracting states accepted the elevation which affected the least number of inhabitants. That is 2,755 people to be displaced at an elevation of 1325 feet rather than 25,950 people to be displaced at an elevation of 1345 feet.(62) But it took a lengthy deliberation among the basin stales to find the solution which also accepted

a lower hydropower output. Rwanda for instance, as a country with land for resettlement of large number would not accept the displacement of 22,975 people at a dam elevation of 1345. Instead it accepted the displacement of 2,220 people at an elevation of 1325.

In the case of Lake Victoria and the Nile one question related to the control of the Owen Falls Dam might still lead to conflicts between Egypt on the one hand and on the other, Kenya and Tanzania. The position of Uganda would be treated seperately.

The purpose of the Owen Falls Dam was primarily facilitate year round storage of water from Equatorial region. Its location was at Jinja, the Nile outlet from Lake Victoria and with controlled sluices which are closed and opened according to water needs of Egypt. In other words during the heavy floods from the Blue Nile the storage function would be engaged by closure of the sluices. On the other hand they would be opened when the Blue Nile supplies are down.

The dam was also to be used for hydroelectric power generation for Uganda, which was the most important benefit <u>in situ</u>. Therefore, the Egyptian storage function of the dam was to be balanced against Uganda's hydropower needs. The Egyptians and British Government - for Uganda agreed an initial temporary discharge rate of 600 - 630 cumecs but that later, settled for 630 cm a permanent discharge rate of 505 cumecs.

Certain conditions were expected to follow that rate of discharge and they are significant factors for easing environmental stress arising from the dam construction:

(i) Storage in Lake Victoria will be allowed with the effect of (periodically) arising level of the water upto 1.3 metres above

the previously recorded maximum, with a range of 3 metres.

(ii) Egypt will pay the cost of raising the dam at the Owen Falls to the height required to obtain storage.

(iii) Egypt will pay full compensation for any adverse effects or disturbances of lakeside interests (i.e. around Lake Victoria)" (63)

There are other conditions but the foregoing establish the relevant point, namely, that the control of the outlet using the dam to store water for the benefit of Egypt would lead to rising level of the Lake by upto between 1.3 metres and 3 metres.

The conditions were duly accepted and included in the Exchange of Notes between British and Egyptian Governments, constituting a formal agreement between 1952 - 53. The Egyptian Government would be responsible for the cost of Owen Falls dam by the use of Lake Victoria for the storage of water. Secondly, the Egyptian Government would bear cost of compensation to those whose interests may be affected by the implementation of the scheme. Thirdly, the Egyptian Government agreed that for the purposes of the calculation of the compensation under the provisions as above all new flooding around Lake Victoria within the agreed range of three metres shall be deemed to be due to the implementation of the scheme.

The predicted rise actually occurred steadily from 1961 reaching its highest point estimated to be three metres in 1964, which was described as an unusual and unprecedented rise by Hydrometeorological Survey Team (64)

The consequences were manifold : large areas of coastal

land formerly for agriculture were inundated; sandy fish breeding sites were submerged leading to disappearance of a number of species such as tilapia esculenta and proptopterus. Besides, pierage facilities at Kisumu, Kendu Bay, Homa Bay and Asembo Bay were submerged forcing the East African Railways and Harbours to seek alternate landing facilities. And these are precisely the changes that were anticipated at the beginning of Owen Falls construction. In fact, Uganda had objected to the discharge rate of 505 cumecs arguing that it would be detrimental to the east African Railways and Harbours. (65)

The Hydromet Survey should have given a decisive answer to this question but they did not. Instead they proposed that the raised level and eventual flooding could have been caused by excessive rainfall in 1961. No attempt was made in the report to ascertain the impact of the controls at Owen Falls, a matter that was clear in history. But Kenyan and Tanzanian politicians pointed their fingers at the Owen Falls as the cause of the expensive environmental injuries. (66)

Neither Kenya nor Tanzania has taken up this matter to seek redress and possibly compensation which was the undertaking of Egypt. It is conceivable, however, that the control of discharges at Owen Falls will continue. Possibly Uganda may propose modification to enhace power generation. All that will be happening within a pressure point, where conflicts may arise between Egypt and possibly Uganda on the one hand and on the other, Kenya and Tanzania. In the alternative the conflict may flare up when Egypt seeks restrained use of the rivers for irrigation or even the Smith Sound project. Therefore, the question of future control of the Owen Falls dam either for the benefit of Uganda or Egypt could lead to an acute conflict.

4. WATERS OF THE SADCC REGION

(a) Introduction

The Southern African Development Coordination Conference (SADCC) was established as a permanent institution in 1980 to provide a strategy for the so-called "Front-Line States" neighbouring South Africa, to maximize their independence of South Africa. Through the organization, the member states, namely Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe were to work out a form of collective self-reliance on economic, social and transportation matters.(67) In the second paragraph of the "Declaration by the Governments of Independent States of Southern Africa" met at Lusaka on 1st April 1980, to create the SADCC, the states affirmed :

> "In the interest of the people of our countries, it is necessary to liberate our economies from their dependence on the Republic of South Africa to overcome the fragmentation and to coordinate our efforts toward regional and economic development"(68)

Reasons behind the mobilization of the states into SADCC maybe further articulated in three crucial terms. First, all the states are economically underdeveloped. Consequently, they should seek every strategies to mobilize the natural resources within their jurisdiction for development. Secondly, they had been hit rather severely by drought which ravaged most of Africa since mid 1970s, with a further climax in 1982 - 83.(69) In this regard management and control over water resources is a conditio sine quo non of development. Thirdly, these are also the "frontline states" caught in the perennial

political turmoil generated and sustained principally by the bad relations with the Republic of South Africa. Other causes of the turmoil in the region include, inter alia civil war in Angola and Mozambique which, ostensibly originated from lack of agreement on the system of governance but have been significantly maintained by South Africa's attitude towards black African governments.

While it is true that South Africa has had a hand in destabilization of these countries it should also be recognized that drought, famine and general lack of development render these states amenable to internal instability. For these reasons it is important to examine what degree of control the African states are having over their water resources, in juxtaposition against South African intitiatives.

Within this region (see Map page 42) there over ten rivers which are international in the sense that they either traverse the territories of two or more states, or they form whole or part of the boundaries of such states.

In assessing the control and utilization of these waters account is taken of the needs and capabilities of South Africa and the fact that it will seek more and more water beyond its jurisdiction; the political turmoil in the region and the fact that South Africa's determination to reach the waters has not been deterred by their poor political relations with the black African countries. Finally, attention should be paid to the actual water needs for agriculture in the front-line states. Thus, the first important factor to understand in this region is the political scenerio. Secondly, we shall outline some of the initiations of South Africa toward the utilizaiton of water from SADCC region. This will be followed by an examination of the initiatives of the SADCC states themselves. Within this context the Zambezi Action Plan (ZACPLAN) is given a special treatment as a regional

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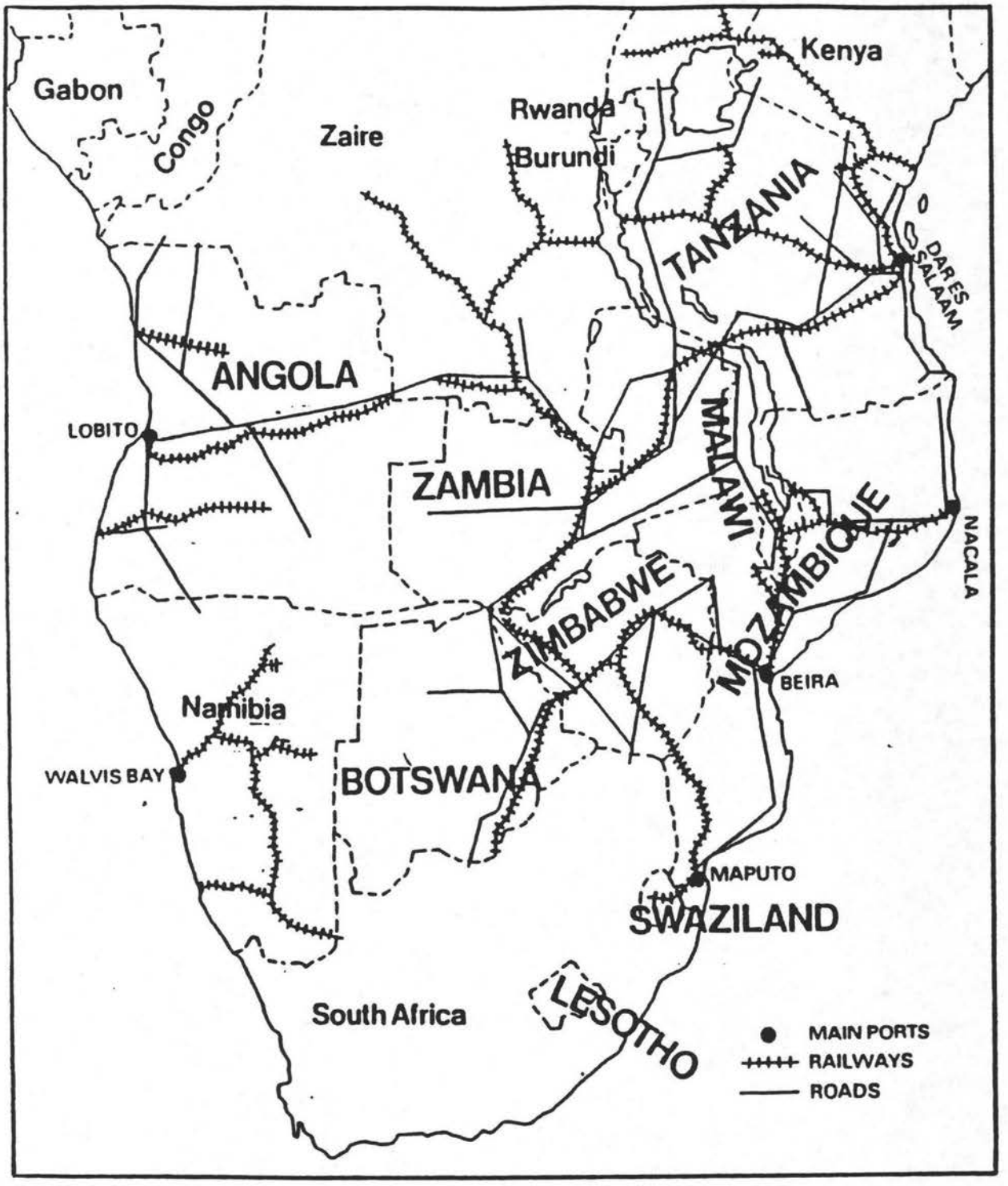


Position of the SADCC States.

project but which emerged as a part of the global initiative of the United Nations Environment Programme (UNEP). The final section examines the future perspectives for water utilization in the SADCC area. It is noted that the current range conflicts in the region were not as a result of access to or management of water resources. However, what South Africa is doing in its planned control of waters from these countries is tantamount to "partial desication" of the SADCC. Indeed, such measures may lead to conflict long after apartheid has ended.

(b) The Political Perspectives in the SADCC Region

The history of the frequent occurrences of battles to end apartheid in South Africa are well-known. The focus of the regional conflicts has been in the objection to the treatment of the South African Government against the black people. Thus, a detailed discussion of the political perspectives in the SADCC region risks being superflous in a paper of this scope. Therefore, this section is limited to those matters which are likely to be exacerbated by the exigencies of utilization of international water resources.

The actual causes and manifestations of the hostilities and violence in southern African region may be summarized and discussed the following categories : (a) Apartheid and associated protests in South Africa. (b) Bantustans as the concretization of apartheid. (c) Civil wars, particularly in Angola and Mozambique. All these have different degrees of imbrications but are differentiated for analytic purposes, and are discussed in turn.

(i) The white settlers in South Africa may be properly perceived by Africans as other colonial settlers

once in Kenya, Zimbabwe, Nigeria, Tanzania, Ivory Coast or elsewhere in Africa. With time they were expected to allow for majority rule through universal adult suffrage. That is what would be considered as the advent of authentic political independence. Instead, however, they imposed a government on the principle of seperation and inequality of races, with the Africans who are the majority relegated to the lowest social echelon.

Consequently, to the Africans, South Africa is actually a situation of internalized colonialism. That is the colonial power are internalized and are not expected to be expelled as was in Kenya. Rather they settle as were the Spaniards in South America. The liberation movements in South Africa are demanding majority rule and have had to fight from the neighbouring countries - the SADCC states. This has often led to the devolutionary situation where South African forces pursue the liberation forces and interdict damage within the black African states. Among the major events have been military attacks on Angola, Botswana, Lesotho and Mozambique.

The attacks on Angola have in the past been complicated by the Nabian situation as South African forces actually occupied the Angolan Ruacana hydroelectric power dams in 1981. Angola was prevented from access to the power which South Africa utilized freely in Namibia.(70)

There have been recent signs that apartheid may end one day. But the moves are still viewed with suspicion. The point one keeps in mind, whatever is that it is difficult to conceive peaceful collaboration between the government in South Africa, as it is, and the SADCC in water resources management. But for the actual trends, read on.

(ii) Bantustans as homelands to black South Africans was an invention to effedt the seperation of races. The concept and practice evolved steadily: The South African Parliament passed the "Promotion of Bantu Self-Goverment Act" in 1950, Then in 1971 it passed the "Bantu Homeland Constitution Acts" The former statute set out the principle while the latter provided the constitutional structure of the homelands. Blacks were allowd to work in South Africa only as migrant labourers, making South Africa the only country where the majority of the residents are non-citizens. For the Bantustans, South Africa initiated the creation of special constitutions and laws to apply to the people of Bantu origin. This then was the powerful fiction of statehood which the international community rejected firmly.(71)

There are five Bantustans : Transkei - 1976, Bophathutswana - 1977, Venda - 1979, Ciskei - 1981 , and Chief Buthelezi's Kwazulu.

As a rule, all the OAU member states (except Malawi) are firm on their oposition to South African Government and the Bantustans. Therefore they donot conduct diplomatic relations with them. But the entrangled skein of international waters in the region once put Botswana in an extremely embarrassing situation.

About a decade ago the City of Gaborone realized that the Gaborone dam which serves the domestic and industrial water needs of the city had proved inadequate in capacity. The solution was to raise the elevation of the dam by eight metres inorder to expand its storage capacity. The financiers would not commit themselves without a "no objection" statement from South Africa from whence the Notwani River (a tributary of the Limpopo), which is impounded by the dam, flows. For its part South Africa argued that the Notwani, in fact, flows from

Bophuthatswana, and urged Botswana to seek the clearance from the Bantustan. Finally, Botswana had to obtain the clearance and the dam level raised after a circuitous legal argument and diplomatic persuation through a U.N. agency. Otherwise the situation was one of a conflict in which Botswana was virtually helpless. On the other hand one could envisage Botswana adopting the attitude of Egypt to the effect that one obstructs the headwaters of the only life giving river Botswana would go to war. In which case these would be a situation of an acute conflict with its foundations in apartheid and its Bantustans.

(iii) The civil wars in Angola and Mozambique have had very close nexus with the South African apartheid problems. The wars started immediately after Portugal relinguished colonial control over the two countries in 1974 for Mozambique and 1975 for Angola. Both countries declared their ideological commitments to socialism , a matter that aggrevated South Africa's already serious concern for countries hostile to its own social policies.

In Angola Jona's Savimbi's UNITA movement was supported by South Africa and the United States to bring down Augustin Neto's socialistic MPLA government. In Mozambique, on the other hand, the RENAMO (also called MNR) was supported by South Africa to fight the socialist FRELIMO government in Maputo. The commitment of both rebel movements has been to destabilise the governments, impede development and to force a breakdown of any civil administration. In the process they attacked and destroyed transport and communication infrastructure;[72] attacked electricity power lines especially the Cabora-Bassa-South Africa transmission line;[73] creating major flight of refugees.[74] They also impeded the opening up of development activities such as the construction of electricity power lines from Cabora Bassa

to the development area 1500 kilometres to the north of Mozambique. The fact that the wars interfere with the hydroelectric power possibilities is already evidence of acute conflicts involving the management of international water resources, knowing very well their vulnerability and critical place in national development.

The situation is significantly compounded by the political position of Malawi's President Banda who though a member of SADCC, has made no secret of close relations with South Africa as well as support for RENAMO.

In fact, Banda's support for the rebels has been understood to extend to territorial ambitions. A phenomenon called "Banda's Dream" is reported to be the President's plan for a a "Greater Malawi" extending to all Mozambican land north of the Zambezi and giving his landlocked country access to the sea.(76) That already has something to do with the control of Zambezi and sea coast. The net fact is, of course that such conflicts are inimical to the prospects of coordinated water resources management in the shared basins.

C. SOME SOUTH AFRICAN INITIATIVES ON SADCC WATER RESOURCES

The most slient feature within SADCC region is the range of acute political conflicts which are likely to continue for several years to come. The other feature is the widespread drought leading to severe food shortages and famines which may, in fact, exacerbate the political conflicts. It is the latter that necessitates collaboration among the different SADCC states in the management and utilization of the waters of the shared drainage basins to support development especially for agriculture and hydroelectric power as a renewable energy resource. Ironically, it is South Africa, perceived as

the aggressor against the regional states that has taken the lead in survey and planning for utilization of the international water resources.

In this section four examples of projects involving conservation and use of international water resources are outlined. In the process, the regional political conflicts associated with such projects will easily suggest themselves. The cases are :

(i) Cabora Bassa Project
(ii) The SARCCUS
(iii) The Highlands Water Project
(iv) The Chobe - Vaal Water Project

(i) The Cabora Bassa Hydro-power Project

The plans to construct a hydroelectric power station at Cabora Bassa on the Zambezi River were conceived by Portugal and South Africa in 1966 during colonial Mozambique.[77] The primary condition was that the project would be executed only if South Africa was to buy the major part of the power produced. Three years later, a contract was signed for the construction of a dam with the capacity to produce 4,000 MW of which the South African Electricity Corporation (ESCOM) was to buy 680 MW in 1975 and 1.500 MW by 1980. The transmission would be to Pretoria.

The supply would be for South African industrial and municipal uses. But to be beneficial the supply must be assured by Mozambique. At the same time, it would be precarious if the line remains subject to RENAMO guerrilla interruptions. And that is the irony of the situation as the RENAMO guerillas supported by South Africa have frequently interferred with the line for substantial durations rendering the lines inoperative. Possibly it suggests that South Africa uses the power

only to supplement its other sources. Ultimately, however, it underscore the vulnerability of the utilization of water resources in the SADCC region.

(ii) THE SARCUSS

The Southern African Regional Commission for the Conservation and Utilization of the Soil (SARCUSS) was established in 1950, a product of the World War II experience that water and soil resources required careful husbandry and on a regional basis.(78) In their justification of the project the founding states laid strong emphasis on the major rivers of the region, namely : the Orange, Limpopo, Zambezi and Congo, all of which are international in character, carrying their load of water and silt leaving the impoverished soil behind. Moreover, that water needs to be harnessed for various development purposes including domestic and agricultural uses as well as for hydroelectric power.

The members of SARCCUS were Angola, Botswana, Sao Tome and Principe, Mozambique, South and South West Africa (now Namibia), Rhodesia and Swaziland. It will be evident from the names that the membership has not been steamlined in recent times. What is clear is that once they became independent Angola and Mozambique ceased participation in the SARCCUS.(79) Zambia never joined but the post-independence Zimbabwe is a nominal participant. South Africa has maintained a leadership role and, presumably, through the work of the organization it is able to assess the distribution and abundance of water resources in the region outside the Republic and how it can benefit. This detailed knowledge of the regional water resources gives South Africa an advantage over her neighbours in planning and access.

(iii) THE LESOTHO HIGHLAND WATER PROJECT

On September 29, 1986 President Botha of South Africa, announced that his country and Lesotho had agreed to the implementation of a R4,000 million project to get water from the Malibamatsu and Singu Rivers in Lesotho highlands diverted from their southward course to the Vaal Valley in the North.(80) The treaty for that project was in fact, signed by Colonel Thaabe Letsie and R.F. Botha on behalf of Lesotho and South Africa respectively,at Maseru on teh 24th October 1986.

The main purpose of the Project is specific, namely :

> "The purpose of the Project shall be to enhance the use of the water of the Sengu/Orange River by storing, regulating, diverting and controlling the flow of the Sengu/Orange River and its effluents in order to effect the delivery of the specified quantities of water to the Designated Outlet Point in the Republic of South Africa and by utilizing such delivery system to generate hydroelectric power in the Kingdom of Lesotho".(81)

In the ensuing sub-paragraphs the treaty allows each party to undertake ancillary developments in its own territory, including irrigation, tourism and fisheries. When fully developed, six major dams are to be within Lesotho territory. The impoundment will then be pumped through a 120 kilometres tunnel (alongside 220 kilometres of roads) to flow northwards to the Vaal River System.

South Africa will by the water from Lesotho and the delivery schedules were agreed upon effective from 1995, when the amount is expected to be 57 million cubic metres

The amount supplied annually is to rise steadily to the year 2020 when the volume supplied is to be 2,139 million cubic metres. After that the annual delivery is to remain at 2,208 million cubic metres.(82)

This project is analogous to the Cabora Bassa scheme in that the funding arrangement is contingent on the assured market. But the Lesotho Government was to seek financing for all the construction work in its territory.

A number of critical points have been raised to suggest that Lesotho's long-term gains in employment and irrigation are negligible.(83) In fact, agricultural activities, including grazing fields would be reduced to prevent soil erosion and consequent dam siltation. Besides, some grazing and agricultural fields would be inundated.

Be such arguments as they might, there are still two important issues to raise : First, all along Lesotho has been subject of military attacks by South Africa to interdict damage to the anti-apartheid guerillas. South Africa may have determined that Lesotho will have to comply with the terms of the agreement, anyway.

The second point relates to the users of the Orange River of which Malibamatsu and Singu are tributaries. Namibia is the lowest riparian but it didnot have a direct say on whether the diversions are acceptable. Behind this issue lies a possible future conflict. Let us recast the background briefly.

Following a number of the ICJ opinions and decisions about the legal status of South African presence in Namibia The United Nations General Assembly adopted Resolution 2146 (XXI) on the 27 October 1966 placing Namibia under the direct responsibility of the U.N. In May 1967 the General Assembly established the U.N. Council for Namibia

and declared it the Administrative Authority for Namibia, empowered to administer the territory and ursher the people to independence. (85)

In the course of its activities the Council sought to protect Namibian natural resources from indiscriminate exploitation in a manner that jeopardizes their availability for the development of the independent Namibia. Accordingly, on the 24 September 1974 they adopted Decree No.1 for the Protection of Natural Resources of Namibia. At a Symposium held at Geneva from 27 to 31 August 1984 to discuss the implementation of the Decree one of the recommendations called upon the Council to take appropriate measures to actively counter South Africa's claims to, inter alia, the Orange River.(86)

Before the financiers of the Highlands Water Project could approve the funds they required a "no objection" statement from the upper riparians. It was, in fact Lesotho, and not South Africa which requested such a statement from the U.N. Council for Namibia. By an aide memoire No. 607 dated 27 November 1984 Lesotho made the request and the Council granted it on March 28, 1985.(87) How the Council for Namibia accommodated these contradictions is unclear. On the other hand, how the independent Namibia will react to this development particularly towards Lesotho remains to be seen. But the implementation of the project was scheduled to begin in 1987 and to be completed in 1994.

For a newly independent Namibia facing the multiple challenges of development the question of dependable supply of wholesome water is paramount. In the end, the conflicts that may arise between Namibia and Lesotho for what seems a dishonest conduct may be imponderable.

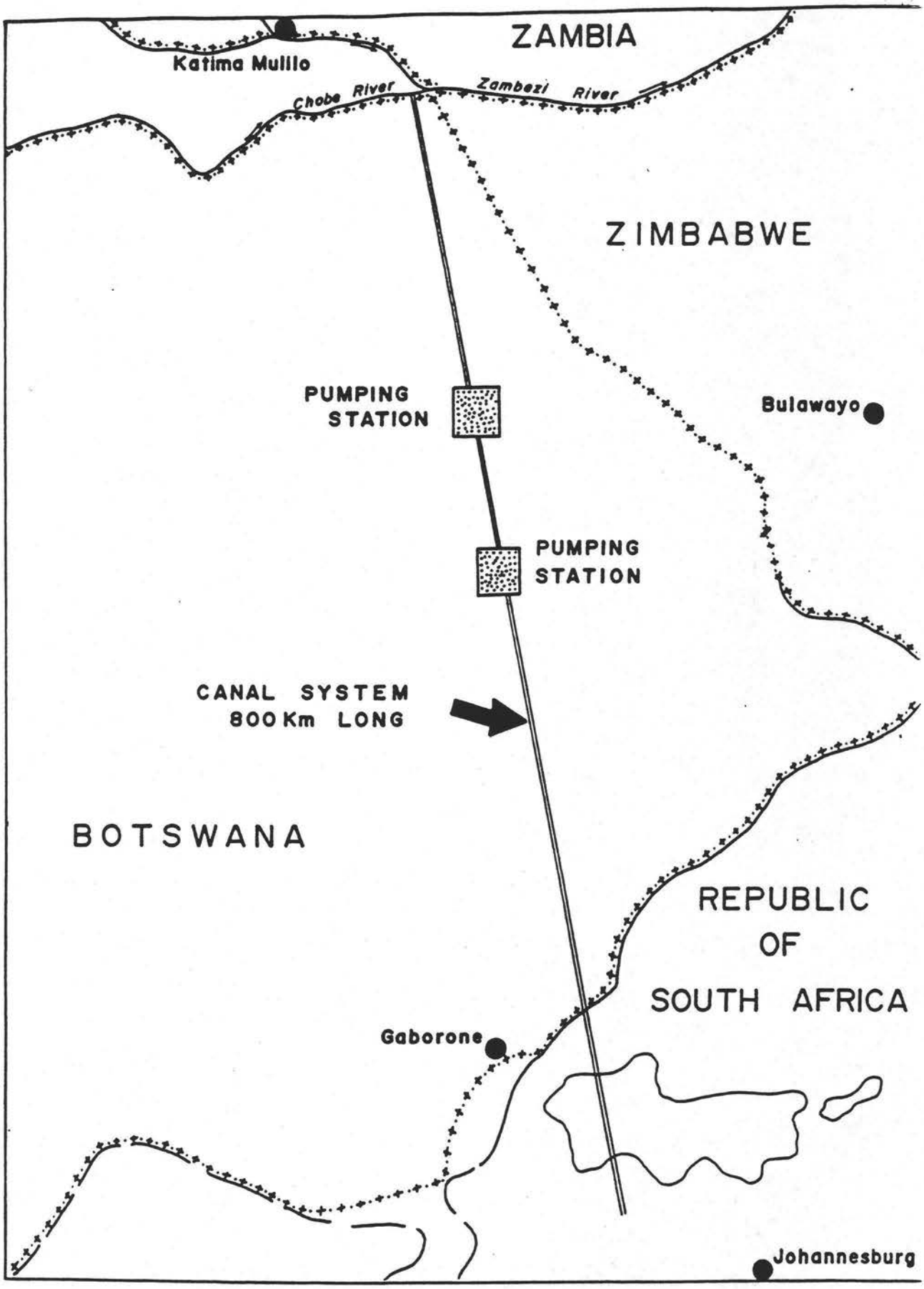
Secondly, there may be conflicts from within Lesotho itself if the future generations find that th treaty terms were in fact inequitous.

(iv) THE CHOBE - VAAL WATER PROJECT

The stress on the water resources of the SADCC region may be estimated by the apparent imagination and technological investment which South Africa is applying to secure more of that water for itself. In this case, South Africa plans to transport water from the Chobe, one of the main tributaries of the Zambezi, north of Botswana.

South Africa calls it the "Zambezi Plan" and it was confirmed by Clans Triebel the Minister for Water Affairs to have been the department's long-term plans.(88) The Zambezi would be tapped at its confluence with the Chobe, near Katima Mulilo and Victoria Falls by a weir (See Map page 54) The water would flow to southern Botswana and to the Rand, then lifted by pumping stations across the escarpments to the Vaal river system, a total distance of 800 kilometres. The plan would avail 2,400 million cubic metres of water per year, 133 percent more than the amount available at present. The total cost of the project would be approximately R9,000 million.

At present there is no project of that magnitude by one or a combination of SADCC states generally or the riparians of the Zambezi, in particular. There is no evidence that South Africa has consulted with the basin states nor yet taken into account their long-term water needs for irrigation, industrial and domestic uses. Should the SADCC states come up with projects whose needs for water are more or comparable, the competetion could



The projected canal scheme which would bring Zambezi water through Botswana to a reservoir near the West Rand.

be precarious. Certainly it is a competetion which might not mix well with the history of political conflicts in the region.

D. INITIATIVES OF SADCC ON INTERNATIONAL CONSERVATION

The term conservation is used here to mean, inter alia, plans for sustainable utilization and to avoid waste of water resources. The plans of South Africa are already clear. The Republic has charted its own water resources comprehensively and to thorough details.(89) With that knowledge they plan the necessary conservation, supplementation and the strategic reserves. Thus, in the Chobe - Vaal plan they knew precisely that the transfer would provide the additional required water at the opportune time.

Among the SADCC member states the efforts in interstate conservation are still scanty. So far there are two initiatives which are by the states and they will be discussed in turn : (a) The initiatives of the SADCC as an organization and (b) The Permanent Joint Technical Committee.

(a) THE SADCC SOIL AND WATER CONSERVATION

In its programmes to initiate cooperative development among the nine member states and to disengage themselves from dependence on South Africa, the SADCC states identified thirteen major subject areas for their programmes. Each of the subject area was assigned to a member state to coordinate the work in the region and to report to the group.

Soil and Water Conservation and Land Utilization Programmes was allocated to Lesotho. However there were no details of what is to be done. The Lusaka Declaration adopted by SADCC inaugural Conference in April 1980 made a brief statement regarding the threats by environmental degradation and called for strengthened programmes of environmental protection. One other paragraph specifically called for concerted action for the exploitation of natural resources, in particular, the common hydrological basins.(90)

Todate the Lesotho-based programme has functioned largely as a clearing house. It has also organized a number of thematic Workshops. Regular information are disseminated through the informative Newsletter, SPLASH which is for exchange of conceptual and practical views.

(b) THE PERMANENT JOINT TECHNICAL COMMITTEE (JPTC)

The terms of reference of an organization to be known as the Joint Permanent Technical Committee were adopted by three governments : Botswana, Mozambique and Zimbabwe at an inaugural meeting their representatives at Harare, November 23 to 24, 1982. Its mandate covered all water matters of common interest. But the Committee, to be convened as and when the members deem necessary, was to be composed of four representatives from each government.

The functions and duties of the JPTC included, inter alia, taking measures to alleviate short-term shortages on rivers of common interest especially during drought; apportionment of the flows of such rivers; draw up programmes, operations and control of abstraction of water for use by the contracting states; to assess and investigate joint schemes on rivers of common interest;

and to set up standards and costs for projects of common interest, especially to ensure equitable apportionment of the waters.

No doubt, the JPTC was a result of the drastic drought within the SADCC region. Botswana, for instance had not had only rains for nearly three years and it had just obtained technical support from Sweden to investigate its ground water reserves. Mozambique situation was equally precarious with the perennial warfare. It had just negotiated a UNDP assistance(91) to establish a National Water Resources Institute to mount a major programme in water resources management.

While they were working on the memorandum South Africa had design over the Zambezi, a river of common interest to Zimbabwe and Mozambique. The infrastructure were routed through Botswana but there was no known protest from any of the members of the JPTC! Possibly the countries will wake up to these problems when the works are completed and thus have a sound recipe for a major conflict.

It is the Limpopo River which is of direct interest to all the three states. With this in mind, the JPTC was to be a prelude to the creation of Limpopo Basin Commission (LIBACO) which was indeed being negotiated by the three states. To date, however, the activities of JPTC and or LIBACO have not been made public, if there are any.

In actual fact, very little water goes down the Limpopo to reach Mozambique. The main Limpopo catchment is in South Africa (including Bophuthatswana). South Africa has several irrigation works upstream. On the other hand, the southern Zimbabwe which has a subsidiary catchment there is scanty rainfall.

For Mozambique it seems that any serious planning would have to include Zambezi, Save and the Southern rivers of Limpopo, Olifant and Knomati. Some inter-basin transfers might also be necessary. For these reasons the security of the Zambezi and Save waters is critical to Mozambique. In which case, an enemy of Mozambique would be sure to weaken the state and to forment social conflicts by constricting the flow of these rivers. It is conceivable, for instance that any intensification of irrigated agriculture in the Lundi and Sabe basins in eastern Zimbabwe might soon compel serious Mozambique-Zimbabwe talks. At present, however, Mozambique is preoccupied with the internal civil war. Besides, there is lack of national technical capability to plan and execute the requisite negotiations. Most likely, by the time the capability is available there will be no surplus water to negotiate for. That in turn may leave acute internal strife wrought by drought and hopelessness. Thus, a long-term strategy must begin with the development of high level manpower for each of the SADCC countries; people who can talk the same planning language.

(c) THE ZACPLAND : A Step Further?

The latest in the efforts by the SADCC region is the Zambezi Action Plan - (ZACPLAN) commenced as part of UNEP's programme on Environmentally Sound Management of Inland Waters (EMINWA). Three meetings of the Group of National Experts from April 1985 led to the Draft Agreement which was eventually adopted by the member states.[92] The participating states are: Angola, Botswana, Namibia, Zambia, Zimbabwe, Mozambique, Malawi and Tanzania. Article 3 (2) specifically designates SADCC as a participant of the organization.

The central institution, the Zambezi Basin Coordinating Unit is to be a clearing-house of information as well as a coordinating centre. Research and operations are to be done by national institutions which will also do the implementation of projects.

The ZACPLAN evolved, diplomatically, at the request of the basin states. For UNEP Governing Council must receive request from the member states to start a project. In actual fact, it remained a "UNEP Project" with the participation of the interested institutions such as UNDP, FAO, UNESCO, WHO, IUCN and the International Lake Environment Committee (ILEC). As two UNEP officials once observed "the water projects of UNEP have been implemented in different parts of the world. Considering that UNEP is not an executing agency these projects were implemented by and in very close cooperation with U.N. Regional Commissions, UN DTCD, UNESCO, WHO and others" and added, "The first activity of EMINWA programme is the preparation, approval and implementation of the Zambezi Action Plan".(93)

The point is that projects like this one, initiate form external forces are often slow to get regionally internalized, to receive local motivation and commitment and to finally operate on their own. Not that the projects are not sound and relevant. Rather it often occurs that there is very little competence and commitment to internalize the projects. It takes competence and commitment at the governmental level to force the project to high priority and to set aside resources for implementation. Besides there must be adequately committed researchers to give follow ups of relevant information.

The implementation of ZACPLAN will be a good test case. The ZACPLAN regional states need to take stock of water resources of the Zambezi, assess the national master plans

for immediate and long-term irrigation plans and to ascertain the implications of such projects as the Chobe-Vaal before the implementation is started. Once infrustructure for such projects are established it is difficult to correct the programmes. Possibly, major international conflicts will ensue.

(d) THE FUTURE PERSPECTIVES

The above discussion has shown the SADCC as a region of utter and perpetual conflict. By and large most of the conflicts have some links with South Africa and its apartheid policy. At the same time South Africa remains a dominant economic and technological power within the region.

It is clear that South Africa has very long-term plans for use of its own water for agricultural and industrial purposes. It has further identified the future deficits and the sources from which it can make up for the difference. There is evidence that its plans are to get the additional water from the SADCC countries and it has in fact charted strategies for getting it sometimes without consultation with the basin states. An example is the Chobe-Vaal project. Or it will get the water at the peril of the other basin states as in the case of the Highland Water Project. In either case there are chances of major conflicts once the basin states fully appreciate the implication of the projects.

Possibly, the basin states may not develop sufficient technological capability to appreciate the implications of South African action. In the end the South African water strategies may gradually desicate the basin states leaving them with a state of perpetual water shortage and consequently, poor agricultural productivity, leading to poverty, famine and perpetual internal unrest.

4. COMMON FEATURES AND CONFLICT AVOIDANCE

This section attempts to extrapolate some of the common features in problems of management of international rivers and to hazard some recommendations on how to move away from the problems. As a point of departure we take the fact that the management of the river basins is desirable. It will lead to harnessing the water resources for irrigated agriculture as well as for hydroelectric power generation. And both are activities which are desirable to extirpate the miserable image of drought, famine and misery out of the African continent. The second point of departure is that unless the management of the international drainage basins, particularly the control of flow regimes and abstraction of quantities of water, is done in an orderly manner agreed upon by all basin states then acute conflicts will be inevitable. Both of these points have been demonstrated in the above discussions as manifestations and consequences of environmental stress.

Mr. Luckens, a United States Congressman has shown utter frustration at the fact that countries in the Middle East and Africa have not respectively, come together to agree on the coordinated management of their international waters to avoid future conflicts. In utter frustration Congressman Luckens proposed as follows :

> ".....that it is absolutely vital that some agency step in now and either plan one or two routes one for the emergency that is going to hit us in 20 years, and these people suddenly awaken to the fact that there is not enough water for their population to survive

> and be prepared for that a crisis management of kind of thing or - I just detest this route - the more advanced nations of the world start pressing these people even to the point of suspending financial aid if they don't come to the table and start looking at a water management program immediately".(94)

But innocent and serious as the statement seems, it missed the point on several scores. First, on questions of environmental stress it is not always easy to have an agreement even among the purportedly most enlightened of states. The question of acid rain in western Europe and between the United States and Canada are examples in point. For a long time the United States refused to cooperate on an issue which alot of people thought self evident. The western European states accepted to cooperate after serious complaints from Scandinavian countries over a very long time in 1960s and early 1970's.(95)

Moreover, even after an agreement is reached there is little assurance that the stress will be mitigated. This is clearly demonstrated again by the boundary waters problem between Canal and the U.S. which has been a subject of numerous commentaries. Canada and the U.S.did not need the warnings sounded by the International Joint Commission (established in 1909) in 1918 that "conditions exist which imperil the health and welfare of the citizens of both countries in direct contravention of the treaty".(96) So by 1970's Lake Erie was described as a cesspool with mortuary smell. It is doubtful that the recent efforts at restoring the lakes will actually render water good for human consumption.

Let us look elsewhere and for more serious issues in the African setting

In both cases : the Nile and Lake Victoria complex there is the factor of a dominant regional force : Egypt and South Africa. Both are not equally dependent on controlled river water for agriculture. The case is more so in Egypt than in South Africa. But there are a number of attributes which the two countries have which barely exist in the other African countries. These are : comprehensive water master plans and expertise or technological capabilities. These two attributes may be considered as the prerequisites for peaceful water resources management and may be discusssed in turn.

First a comprehensive and national water master plan should take into account the national water needs for agrarian, industrial and domestic uses over-time. Against these, the master plan should juxtapose the quantities of water that are available to it first, exclusively within national jurisdiction, and then determine the water resources of the shared basins. A projection of these resources should be modelled and programmed over-time taking into account such factors as the growth of national population.

Clearly, this must be the kind of studies which South Africa has carried out leading it to seek the seemingly remote sources such as the Chobe - Vaal project. Doubtlessly, Egypt will have done such studies and, in the absence of clear alternatives it reacts irrationally to any plans for water use for irrigation in Ethiopia.

In the absence of such studies it is pointless pushing the African countries to international negotiations. Only if the master plan can relate the national water needs over time to the national resources and how these relate to the waters of international character will the negotiations be useful. Any agreement based on less information will be short-lived and consequently, a recipte for acute conflicts. It is a recipe for acute

conflicts. It is a recipe for acute conflicts because while the country with inadequate information may call for a review after afew years, the well-equipped state will want the agreement to last.

Secondly, expertise in water resources sciences is the most primary of all conditions for rational management and conflict avoidance. In the case of boundary waters or acid rains in North America the political organs might have been obstinate but expertise existed. Once there is a change in the political attitudes the scientific capabilities can be called upon to work out the remedial measures. On the other hand for water resources management, there is extremely limited capabilities. In a recent Inter regional Meeting on River and Lake Basin Development in Africa, convened at the U.N. Economic Commission for Africa, the representative of UNESCO observed correctly that :

> ".....the field of water resources encampuses a very large variety of socio-economic activities. Water resources development and water projects require, therefore, many different technical and other kinds of manpower, such as civil engineers, hydrologists, geologists, hydrogeologists, agricultural engineers, hydraulic engineers, meteorologists, etc"(97)

On the same pages UNESCO observed that rational and comprehensive management of water resources will only be practical when special educational institutions are established for water specialization at secondary and university levels. It is important to emphasize that each of the areas of specialization should have national cadres trained in research to the highest levels. Indeed, it is not enough to have one person in each because

quality research thrives in competetion and complementarity. In any event, the "etc" in the UNESCO statement is very appropriate because the list doesnot include several other relevant fields in water resources management, such as water and irrigation economics, water quality specialists, and limnologists, and fisheries specialists.

Here again we can refer to another wisdom of Congressman Luckens. He suggested that the lesser developed countries should be offered expertise to assist them in negotiations.(98) Unfortunately sustainable development cannot be done with itinerant consultants who have no lasting commitments to the issues. The negotiations must be done with the participation of the national researchers who have internalized the research information and with lasting commitment and follow up capabilities.

For obvious historical reasons, Egypt and Sudan have developed cadres of high level expertise and research information in the fields related to water resources management. In actual fact, right now the upper riparians have no equivalently trained manpower as does Egypt. Therefore, in any negotiation the representatives will not be speaking at the same level of competence.

An effective negotiation should also find that the national experts composed the national water master plan showing the links between the national water resources and the precise links with the "international" water resources.

If Congressman Luckens and his associates wants a strategy which bears fruits and leads to longterm peaceful use of the water resources the reasonable approach is to provide scholarships to build up Ph.D level and postdoctoral

research capabilities in the areas enumerated by UNESCO. Possibly, several persons in each area of specialization, in given target countries. Thereafter, development of research will be necessary to promote common understanding of the relevant issues. It will take less than ten years to build up the core research staff in each of the target countries, because several people are available who are already educated at Masters degree level as the experience of USAID in Kenya with Training for Development has shown. Numerous well-qualified people are available to pursue doctoral studies in any of the water-related fields.

Once the core of the doctoral level specialists are made available in the national institutions they will build up additional specialists and thus, the system will be self-sustaining. The experts will provide the leadership essential for long term studies, planning and agreements.

One other critical consequence of the build up of expertise is that the specialists will plan for the agrarian mobilization of the water resources for agricultural productivity. It was demonstrated earlier in this paper that land nor water is in short supply in Africa, to impede improved agricultural productivity. The problem is with adoption of technological packages, particularly irrigation, to improve food production. The old belief that irrigation is a cultural attribute which must evolve over generations is also being challenged by studies which show that given demonstration of economic rewards, farmers can pick up the discipline of irrigation fairly fast.(99)

Thirdly, the planning and management of drainage basins requires very large sums of money. At the Addis Ababa Meeting mentioned earlier the UNDP told the participants that it gave to the Kagera Basin Organization (KBO) a total of US$69 million and the Senegal Basin Organization

(OMVS) US$65 million for preinvestment requirements.[100] What was not said was that the estimated cost of investments were approximately US$3.2 billion for the KBO[101] in 1982 and approximately US$ 1 billion for the OMVS in 1985.[102]

In the event that studies are done, as was the case with KBO and hopes raised then money fails to materialize for investment the impact is likely to be negative and lasting in the minds of the basin states. On the other hand, loans may be available but at interest rates which for projects with long gestation periods, actually prove discouraging. Ultimately, there will be very little sense in urging the basin states to sign agreements for the management of their water resources.

For many years the main opponents of drainage basin management were the United States and the IBRD, despite the fact that the IBRD was involved in the Indus Treaty in 1960 which was a special case.[103] Indeed the Indus Treaty worked satisfactorily but that may well be because of the available local manpower not foreign consultants, engineers and all. It is only recently that the USAID and IBRD have shown some interest in the subject area. But the funds made available are invariably as if to ensure that the project fails. In this way, the donors themselves create confusion on issues and priorities a fact which, again reinforces the necessity for building up national capabilities to confront the inconsistences.

Fourthly, the current global climatic changes will create greater levels of anxiety.[104] The African countries have experienced widespread drought, greater irregularity in rainfall with, possibly increasing desertification. The implication is that there will be less and less water to go round. This is bound to lead to greater anxiety among states leading to moves to secure as much of the sources of water as possible before the crisis strikes.

The implication of this trend for the African cases studied herein are imponderable Egypt and South Africa are likely to be increasingly aggressive while the technologically disadvantaged, without the expertise may only resort to sturbbonness accentuated by desperation. Then acute conflicts are inevitable.

Fifthly, increasing population is invariably a cause of environmental stress. But this is particularly so for water resources and its agrarian application for increased food production. With the increasingly unrealiable rainfall the states will inevitably look to husbandry of the existing waters of the drainage basins. For indeed, there will inevitably be internal desperation and instability if food production does not keep up with the population growth. Countries with the know-how will move speedily to harness and/or store the water for their national populations.

A combination of the foregoind two problems is clearly manifested in the Egypt/Ethiopia exchange of unpleasantries witnessed earlier on.

Similarly, South Africa's designs on the Zambezi may impact on the waters reaching Mozambique. But it might also impact negatively on the hydroelectric power options downstream. By the same tocken,when Namibia wakes up to the Lesotho-South Africa designs on the Orange waters especially the manner in which clearance was obtained from the U.N. Council for Namibia it might lead to other unpleasantries.

In sum, it seems that there are several possibilities of acute conflicts in Africa, arising from management and use of waters of international drainage basins. Several factors, such as climatic changes and increasing population are likely to exacerbate the situation. A number of factors, including shortage of funds are likely

to impede the work and negotiations for collaborative managment. But one factor which is an all-round precondition for any planning and negotiation is building up of diverse and high quality manpower in all aspects of water resources research, planning and management. It is not a panacea, but without it, future conflicts are inevitable and the sooner concerted efforts are directed towards this, the better for all interested parties.

FOOTNOTES

1. See details in Okidi, C.O. "The State and the Management of International Drainage Basins in Africa" in 28 Natural Resources Journal 645 (1988)

2. Krishnamurthy, K.V. "The Challenge of Africa's Water Development" in 1 Natural Resources Forum 369, 371 (1977)

3. A report by Egyptian Irrigation Minister Abdel aziz Abdul was reported to have been in the Egyptian weekly newspaper Akhbar El-Yom was scathingly attacked by Ethiopian Foreign Ministry in Ethiopian Herald May 14, 1978

4. Ethiopian Herald June 2, 1978 had a two page statement. For alot more on this, read on.

5. "The Middle East in the 1990's : Middle East Water Issues" House of Representatives, Committee on Foreign Affairs Subcommittee on Europe and the Middle East, Washington DC Tuesday, June 26, 1990 p. 182 Statement by Congressman Luckens.

6. See the evolution of this formulation in Okidi, C.O. "Management of Natural Resources and the Environment for Self-Reliance" in 14. Journal of Eastern African Research and Development 92, 97 (1984) and Okidi, C.O. "Reflections on Teaching and Research in Environmental Law in African Universities" 18 Journal of Eastern African Research and Development (1988)

7. The Working Party Meeting at the Environmental Law Centre in Bonn was convened by its Secretariat to deliberate on a draft Covenant on Sustainable Development. March 14 - 16 1991 Author's notes.

8. For a detailed discussion of the rise of environmentalism Johnston, Douglas M. (ed) The Environmental Law of ghe Sea. (Gland, Switzerland : International Union for the Conservation of Nature and Natural Resources 1981) pp. 17 - 23

9. This is the central theme of the celebrated Brundtland Report of the World Commission on Environment and Development, Our Common Future (Oxford and N.Y. : Oxford University Press 1987)

10. See related discussions in Okidi, "Management of Natural Resources and the Environment for Self-Reliance" in 14 Journal of Eastern African Research and Development 92 -93 (1984) and comments by Ogolla, Bondi D. "The Role of Environmental Law in Development" in 29 Journal of the Indian Law Institute 186 - 189 (1987)

11. See the discussion behind the Founex Report in United Nations Development and the Environment (1971) and the broadly quoted but misleading article by Kasdan, A.R. "Third World War - Environment versus Development" in 26 Record of the Bar Association of the City of New York 454 (1971)

12. Organization of African Unity, Lagos Plan of Action for the Economic Development of Africa 1980 - 2000 (Addis Ababa : OAU 1981) esp. pp. 29 - 43, 95 - 97 Nwakwo, Arthur A., After Oil, What Next : Oil and Multinationals in Nigeria (Lagos : Fourth Dimension Publishers 1982); Yaeger, Rodger, Africa's Conservation for Development : Botswana, Kenya Tanzania and Zimbabwe (Hanover, NH : African-Carribbean

Institute 1987). Okidi, C.O. "Development and Conservation Imperatives Under the 1985 Nairobi Convention" 15 Environemntal Policy and Law 39 - 51 (1985); Okidi, Management Profile and Training Needs for Marine Resources Development" (University of Nairobi IDS/WP 415) 1984; U.N. Report of the First African Regional Conference on Environment and Sustainable Development Kampala Uganda, June 12 - 16 1989 (Addis Ababa Ethiopia : UNECA/NRD/ARCED/MC/3 of June 16, 1989. The Role of Fisheries in Improving Nutrition (Rome FAO, WFC/1980/10 April 18, 1980.

Ojwang, J.B. "The Constitutional Basis for Environmental Conservation : A status Review" (Nairobi : Centre for Technology Studies October 1990); Leonard, H. Jeffrey, "Confronting Industrial Pollution in Rapidly Industrializing Countries: Myths, Pitfalls and Opportunities" in 12 Ecology Law Quarterly 779 - 816 (1985) See many more of the articles cited herein.

We can only cite afew views from newspaper and magazines to show the popular view: "Worry over a polluted environment" Daily Nation (Nairobi) October 12, 1990, p.28 Editorial "Is Industry Fair to the Environment? Daily Nation November 5, 1990 p.6 Mwangi, Patrick "Future Gloomy, Africa Warned" The Standard" (Nairobi) September 18, 1990 p.9; "Trade in Waste Flourishes" Sunday Standard September 23, 1990 p.9 "Global Warming "The Standard" October 30, 1990 p.22; "50m. People : Can we cope? "The Standard" March 29, 1991 p.24; "African Countries Facing Famine" "Kenya Times" March 29, 1991 p.11; "Power and the Environment" "Kenya Times" April 2, 1991; Editorial "Such folly has no place in our times

"Sunday Nation" November 11, 1990; Editorial "Dumping of toxic Waste deserves punishment" "Sunday Standard" November 11, 1991; "Bata moves to clear town of odious stench" "Daily Nation" December 14, 1990 p.11 Supplement; Feature "Focus on Environmental Conservtion : The Common Future of Mankind and Others" "Weekly Review" (Nairobi) December 21, 1990.

13. Browne, Robert S. "The IMF in Africa : Inappropriate Technology" African Business January 1985 p.15 in a whole page Guest Column

14. Krishnamurthy, op.cit. p.371

15. ibid p. 370 See also further discussion in United Nations, Problems of Water Resources Development in Africa, E/CN.14/NRD/WR/2/Rev.2 (1976) p.28

16. Odero-Ogwell, L.A. "The African Food Problem and the Challenge to the International Community" (mimeo. 1982) p.6

17. In the Lake Lanoux Arbitration, Spain raised objection to France's diversion of the Carol River for purposes of power generation while restoring the flow regime without consumption. The Tribunal rejected the claim by Spain. See "Lake Lanoux Arbitration in IZUNRIAA 218 also reprinted in 53 Am.J. Int'L. 156 (1989)

18. United Nations, "Integrated River and Lake Basin Management as a Vehicle for Socio-Economic Developme ELA/NRD/IMRLBD/10 of 15 September 1988. Mimeo paper presented at the Interregional Meeting on River and Lake Basin Development with an Emphasis on the African Region. Addis Ababa, Ethiopia 10 - 15 October 1988. p.2

19. Scudder, Thayer "Executive Summary and Recommendatio The African Experience With River Basin Development" Mimeo paper presented at the Interregional Meeting on River and Lake Development. Addis Ababa, Ethiopia 10 - 15 October 1988 p.6

20. Ongweny, G.S. "Water Resource of Lake Victoria Drainage Basin in Kenya in Okidi, C.O. (Ed) Natural Resources and the Development of Lake Victoria Basin of Kenya (University of Nairobi IDS/OP 34 1979) pp. 68 - 84

21. Kongere, P.C. "Production and Socio-Economic Aspects of Fisheries in Lake Victoria Drainage Basin in Kenya" in Okidi, supra note no. pp. 407 - 410

22. The Kagera Basin has actually been isolated by the riparian states and have created the Kagera Basin Organization for its management. For details see Okidi, C.O. Development and the Environment in the Kagera Basin Under the Rusumo Treaty) (Universit of Nairobi IDS/DP 284 1986)

23. Report of the Hydrometeorological Survey of the Catchment of Lakes Victoria, Kyoga and Albert (Burundi, Egypt,Kenya, Rwanda, Sudan, United Republic of Tanzania and Uganda) Meteorology and Hydrology of the Basin Part II UNDP and WMO RAL 66 - 0250 Tech. Report No.1

24. For details see Howell, Michael Lock and Stephen Cobb. The Jonglei Canal : Impact and Opportunities (Cambridge University Press 1988)

25. Garretson A. "The Nile" in Gerretson, Hayton and Olmstead (Eds) The Law of International Drainage Basins (Oceana Publications 1967) p.259

26. Badr, G.M. "The Nile Waters Question : Background and Recent Developments" 15 Revue Egyptienne de Droit International 2 (1959. This estimate nearly coicides with the figure given by Ethiopia as 85 percent in Ethiopian Herald (Addis Ababa) May 21, 1978

27. Garretson supra note 25 loc,.it.

28. Batston, "The Utilization of the Nile Waters", 8 Int'l and Comp. L.Q. 523 - 25 (1959)

29. The Helsinki Rules Report of the Fifty-Second Conference of the International Law Association, Helsinki 1966. p. 486.

30. The Equatorial Nile Project and the Nile Waters Agreement of 1929 : East Africa's Case (Entebbe, Uganda : Government Printer 1957) p.3

31. ibid

32. A paper by the Egyptian Miner of Irrigation, Abdul-Atta, A. Azim "The Water Policy of Egypt" (Cairo : Ministry of Irrigation 1975, Mimeo p.4)

33. The range of agreements so far signed on these basins have been studied ex-haustively by the present author. See Okidi, C.O. "Legal and Policy Regime of Lake Victoria and Nile Basins", 20 Indian J. Int'l L. 395 - 447 1980; Okidi, C.O. "Review of Treaties on Consumptive Utilization of Waters of Lake Victoria and Nile Drainage Basins", 22 Natural Resources Journal pp 161 - 199 (1982); Okidi, "History of the Nile and Lake Victoria Basins Through Treaties" in Howell, P.P. and j.a. Allan (Eds) The Nile : Resource Evaluation, Resource Management Hydropolitics and Legal Issues (London : University of London, School of Oriental and African Studies pp. 193 - 224 1990)

34. Akhbar El Yom (Cairo) March 13, 1978

35. The Ethiopian Herald (Addis Ababa) May 14th and 21st and June 2nd 1978

36. Daily Nation (Nairobi) June 7, 1980 p.2 cols 2 - 5

37. Sunday Nation January 10, 1988 p.11 whole page feature by Tony Walker "The Nile Struggles to keep up the flow"

38. Reported in The Ethiopian Herald 14th April 1987 page 1, col 4 - 6 to page 3

39. Matheson, Alistair "Harnessing 'riches' of the Blue Nile" The Sunday Star Review (Johannesburg) August 31, 1986 p.38 cols 1 - 3

40. Guariso, Giogio and Dale Whittington, "Implications of Ethiopian water Development for Egypt and Sudan" (Mimeo manuscript, Chapel Hill, North Cardina) Jan 1985 p.3

41. "The Blue Nile River Basin" The Ethiopian Herald 17th May 1969 pp 5 - 6

42. supra note 40 p.12

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44. For details see Okidi, C.O. "Irrigation Activities and Institutions in the Lake Victoria Basin of Kenya" in 3 African Urban Quartely 113, 116 (1988)

45. See a full page Special Report by Tony Walker, "The Nile Struggles to keep up the Flow" Sunday Nation (Nairobi) 10th January 1988 p.11

46. Okidi, supra note 44 loc.cit.

47. ibid and Lake Basin Development Authority, The Study of Integrated Regional Development Master Plan for the Lake Basin Development Area, Draft Final Report March 1987 p.3

48. Reiter, Peter. Nzoia-Kerio Inter-basin Water Transfer Project - Prefeasibility Study (Nairobi : Ministry of Water Development, Sept. 1981

49. Kenya Times (Nairobi) July 14 1988 p.4 cols 2 - 5 and Daily Nation (Nairobi) July 14, 1988 p.5 cols 1 - 5

50. Hurst, H.E. The Nile : A General Account of the River and the Utilization of its Waters (Cairo : Ministry of Works 1952 p.156)

51. Dumont, Rene, Tanzania Agriculture after the Arusha Declaration (Dar es Salaam : Ministry of Economic Affairs and Development Planning, 1969) p.48

52. For details on the following discussions, see Okidi, C.O. Development and the Environment in the Kagera Basin Under the Rusumo Treaty (University of Nairobi, IDS/DP 284 (1986) p.7

53. For the background to KBO see ibid pp 9 - 14

54. ibid p.46

55. ibid pp 54 & 52

56. ibid pp 78 - 79 The four projects for which Uganda commenced detailed formulation are : Rice scheme, Trypanosomiasis eradication scheme, afforestation and rainfed agriculture.

57. Howell Paul, Michael Lock and Stephen Cobb (Eds) The Jonglei Canal : Impact and Opportunities. Cambridge University Press. 1988 p.33

58. ibid and The Equatorial Nile Project and the Nile Water Agreement of 1929 : East Africa's Case (Entebbe : Government Press, 1957) p.7

59. Howell et.al op.cit pp. 438 - 440

60. ibid pp. 441 - 442

61. ibid pp 54 - 57

62. Okidi, C.O. Development and the Environment in the Kagera Basin Under the Rusumo Treaty (University of Nairobi IDS/DP 284 1986 p.82

63. Teh Equatorial Nile Project supra note 58 p8

64. Report of Hydrometeorological Survey of the Catchment of Lakes Victoria, Kyoga and Albert: Meteorology and Hydrology of the Basin Part II 1974 (UNDP and WMO RAL 66 - 0250 Tech. Rep No.1 (Hereinafter Hydromet Survey) pp. 744 - 753

The survey was a joint project of the Government of Burundi, Egypt, Kenya, Rwanda, Sudan, Tanzania and Uganda . Was conceived in 1966 and started operation in 1967. For details see Okidi, C.O. "History of Nile and Lake Victoria Basins through Treaties" in Howell and Allan, The Nile op.cit. pp. 209 - 210

65. The Equatorial Nile Report op.cit. p.13

66. For details of the politicians' views see Okidi C.O. "International Law and the Lake Victoria and Nile Basins" in Okidi (Ed) Natural Resources

and the Development of Lake Victoria Basin of Kenya (University of Nairobi IDS/OB 34 1979) pp. 101 - 158

67. Southern African Development Coordination Conference A Handbook (Gaborone, Botswana : SADCC Secretariat) 1984

68. "Southern Africa : Toward Economic Liberation" reproduced in Appendix D to Southern African Develop: Coordination : From Dependence and Poverty Toward Economic Liberation Report of SADCC Blantyre, Malawi 19 - 20 November 1981 (Gaborone : SADCC Secretariat 1981)

69. For messages of anguish from the region see African Business (London) February 1984 p.21; Commerce (Harare) March 1983 pp. 7 - 9 The Herald (Harare) March 17 1983 p.9 col.1

70. SADCC Energy No.1 January 1983 p.18 (Published by Technical and Administrative Unit, SADCC Energy Sector, Luanda, Angola.

71. There is a series of resolutions of the United Nations espcially since 1971. For instance, UNGA Res 2775-E (XXVI) 1971; 3151-G (XXVIII) 1973; 33224-E (XXIX) 1974; 3411-D (XXX) 1975; 31/6 (1976); 32/105-O-N (1977); 33/183 (1978); 34/93(1979); 35/206-A (1980); 36/172 (1981) 37/8 (1982).

Note further that the procedures for adoption of the "agreements" leading to independence of the homelands has also been considered irregular and unacceptable as treaties. See discussions in Floyd, t.b. "Pre-Independence Agreements Between South Africa and the Black Homelands" in 60 South African Yearbook of Int'l L. 78 - 92 (1980); and

Boyen H., M. Wichers, D.H. van Wyke and W. Breytenb
"Comments on the Independence and Consitution of Transkei " in 2 South African Yearbook of Int'l L 1 - 35 (1976)

72. See "David B. Ottaway's feature analysis "Angola. Its Transport Cripple Guerilla Siege Slips Back to Barter Economy" in International Herald Tribune 30th July 1986 p.1 cols 1 - 8

73. See Antony Robinson's feature article "Nkomati agreement fails to halt MNR sabotage" in Daily Nation (Nairobi) 18th February 1985 p.9 cols 1-6

74. See for instance "6000 flee fighting in northern Angola" in Kenya Times (Nairobi) 4th February 1986 p.8 cols. 5 - 6

75. See Daily Nation (Nairobi) 18th February 1985 p.9 cols 1 - 6

76. Reported in a feature article by David Martin as "Banda's Dream Set to Become a Nightmare" in The Standard (Nairobi) 6th October 1986. According to these reports Banda's dreams date back to 1962 when the President visited Dar es Salaam to persuade President Nyerere to accept the suggestion in an old Portuguese map showing that Mozambique to the north of Zambezi was actually part of Malawi. Nyerere however, refused to accompany Banda to Lisbon to make a case to Antonio Salazaar. The later is said to have agreed.

77. ESCOM : Golden Jubilee 1.3.23 - 1.3.73 (Published by South African Electricity Cooperation, Pretoria) pp. 37 - 93

78. Rowland, J.W. (Ed) The Conserv[illegible]ion Ideal : Being the SARCUSS Record for t[illegible] period 1952 - 1970 (Pretoria : SARCUSS) 197[illegible] p.3

79. Thomas C. "Economic Integrat[illegible] between South Africa and Other States in S[illegible]uthern Africa" South African Yearbook of I[illegible]'l Law. Vol.3 (1977) p.1

80. Reported in The Star (Johannesburg) Sept. 30, 1986 headline on front page.

81. Article 4 (1)

82. The details are Article 7(2) and Anneture II of the treaty.

83. New Africa May 1982 p.42

84. The details are beyond the scope of this paper. For details, see [1950] ICJ Reports 128, [1962] ICJ Reports p.319 [1966] ICJ Reports p.4; [1971] ICJ Reports p.16

85. See the background in United Nations, General Assembly Official Records, Fortieth Session Suppl. No. 24 (A/40/24) 1986 pp. 1 - 5

86. United Nations, General Assembly Official Records, Thirty Ninth Session Suppl 24 (39/24) (1985) p.20

87. Summary Records of the Council's 435th Meeting, New York on 28 March 1985 in U.N. Doc. A/AC.131/SR.[illegible] of 1st April 1985 paras 2 - 3 p.1

88. The Star (Johannesburg) Sept. 19, 1986 p.9

89. Examples are in the works of the Water Resources Commission by Middleton, B.J. W.V. Pitman, D.C.

Midgley and R.M. Robinson, Surface Water Resources of South Africa : Vol.I Drainage Regions A,B - The Limpopo - Olifant System Report No. 10/81 (Johannesburg : University of Witwatersrand Hydrological Research Unit) 1982.

90. Southern African Development Coordination Conferenc From Dependence and Poverty Toward Economic Liberat (Gabarone, Botswana : SADCC Secretariat 1980) Appendix D.

91. UNDP Project No. MO2/81/001/E/13 signed in December 1982. The Executing Agency was to be UNESCO.

91. The Draft Agreement on the Action Plan for the Environmental Management of the Common Zambezi System is in UNEP/WG.159/2/Rev.1 of 4 February 1987.

Note that the title refers to the "Zambezi River System" rather than "Zambezi Basin" which suggests different hydrological concepts.

93. David, L. and M. Nakayama "Human Resources for Environmentally Sound River Basin Management" in Okidi, C.O. (ed) Reflections on the Management of Drainage Basins in Africa University of Nairobi IDS/WP 51 1988) pp 101, 102 - 103

94. supra note 5 loc. cit.

95. See studies within the framework of NATO'S Committe for the challenge to Modern Society (CCMS) and the OECD summarized by Robert E. Stein, "The Potential of Regional Organizations in Managing Man7s Environment" in Hargrove, J.L. (Ed) Law Institutions and the Global Environment (Dobbs Ferry, N.Y. Oceana Publications, 1972 pp. 253-293

96. ibid p.26

97. UNECA, Report of the Interregional Meeting on River and Lake Basin Development, with Emphasis on The African Region. Addis Ababa, Ethiopia 10 to 15 October 1988. Doc. ECA/NRD/IMRLD 7th Nov. 1988 p.11 para 57.

98. supra note 5 p. 181

99. Okidi, supra note 44

100. supra note 97 p.7 para. 31

101. Okidi, supra note 22 p.98

102. Okidi, C.O. Development and the Environemnt in the Senegal Basin Under the OMVs Treaty (University of Nairobi, IDS/DP 283 1987 p.66

103. Baxter, R.R. "The Indus Basin" in Garretson et.al supra note 25 pp. 443 - 485. A Commissioner of the Indus basin, in India told the Addis Ababa Meeting that ".....after the Treaty was signed, in Indus Basin in India alone water utilization increased fourfold. Hydropower generation, which 40 years ago was practically negligible, now stood at 3,000 MW and many more schemes are under executic or planning. Reservoirs with live storage capacity of 11.75 million acre feet (MAF) have been built and more are under execution/planning" see supra note 97 p.14 para.80

104. Hutchinson, Charles F. "Will Climatic Change Complicate African famine" in 95 Resources (By Resources for the Future) pp. 5 - 8 (Spring 1989)