Distr.
LIMITED

ECA/NRD/IMRLBD/12
IRLBD/SYMP/1

Original : ENGLISH

1988

UNITED NATIONS

ECONOMIC COMMISSION FOR AFRICA

DEPARTMENT OF TECHNICAL CO-OPERATION FOR DEVELOPMENT

Inter-regional Meeting on River and Lake Basin Development with Emphasis on the Africa Region

Addis Ababa, Ethiopia, 10-15 October 1988

DEVELOPING RIVER AND LAKE BASINS FOR SUSTAINED ECONOMIC GROWTH AND SOCIAL PROGRESS

United Nations Secretariat

Department of Technical Co-operation for Development*

---

*/ Mr. David LeMarquand, Consultant to the United Nations, assisted in the preparation of this paper. The views expressed in this paper are those of the author and do not necessarily reflect those of the United Nations.

SUMMARY

It is evident that river basin development in Africa can do much to provide environmental stability to wildly erratic hydrologic and climatic cycles, to produce more food and to contribute to economic growth. The experience to date of river basin development in Africa has not proven as positive as in many developing countries. There are too many examples of ill-conceived and ill-suited schemes that contribute to further environmental degradation, social dislocation and hardship, and weaken already stressed national economies. The planning experience in developed countries in the use of multipurpose projects, basin-wide planning, and river basin organizations provides useful lessons in promoting the physical development needed to make use of Africa's rivers. But the experience in Africa suggests that the real challenge for Africans to achieve environmentally self-sustaining water resources development lies in establishing the appropriate social and environmental context for physical development to take place. Attention needs to focus on regional development, multiobjective planning, community participation, environmental resiliency, the institutional arrangements for regional development, and the political and economic conditions within the basin states.

The challenge is all the greater because of a bias towards physical development among the main players in planning and implementing river basis development. Political leaders, planners and the international financial community need to recognize that bias and structure their efforts towards creating the right conditions for self-sustaining projects, that is by turning the evident need for making better use of the continent's waters into widespread economic demands.

Another challenge facing African river basin development as elsewhere is in establishing the appropriate cooperative arrangements for development when a river is shared by more than country. Cooperation is essential to avoid piecemeal development and consequent lost opportunities to optimize economic benefits, unfortunate repercussions elsewhere in the basin, and inter-basin political tension. But cooperative development must emerge from each participating state's clear recognition that international development represents the best means of achieving national objectives. Such a recognition cannot be achieved unless the states have the capability to assess their own domestic alternatives against the international alternatives. National planning institutions must then be capable of carrying out that assessment and thus international assistance should be directed at strengthening the national planning effort.

DEVELOPING RIVER AND LAKE BASINS FOR SUSTAINED ECONOMIC AND SOCIAL PROGRESS

INTRODUCTION

1. In Africa food production has been declining by about one percent per year since 1970. Desertification, drought and deforestation and other forms of environmental degradation are undermining the productive capacity of the land and foreclosing options for future development. It is evident that careful use of the continent's water resources can do much to produce more food and contribute to development through hydroelectric power generation, fish harvesting and improved transportation. It is also evident that ill-conceived and ill-suited schemes can contribute to further environmental degradation, social dislocation and hardship, and weaken already stressed national economies. The issue is how best to ensure timely, productive and environmentally self-sustaining water resources development.

2. The challenge is great, for water resources development in developing regions must be pursued against a background of imposing forces and constraints. External factors include declining terms of trade for agricultural and other commodities, disadvantageous terms of technology transfer, protectionism in developed countries, the debt crisis, lack of foreign exchange, and declining financial flows to the countries that most need international finance. Internal factors include unequal distribution of land and other assets, endemic diseases, and rising population with the consequent stress on land, forest, and water resources. 1/

3. This paper looks at 1. river basin development planning concepts and experiences as they have evolved, 2. their application and aptness to developing countries, particularly in Africa, 3. the role of foreign assistance with emphasis on multidonor financing, and 4. the complications of developing water resources shared by two or more states. The aim is to provide a context for discussing how best to advance well-conceived water resources development in Africa. The paper affirms that river basin development, as the concept has evolved in recent years and in light of the complementary recent thinking on ~~environmentally-sustainable development~~, offers the promise to contribute greatly to solving some of Africa's critical problems. But in recognizing the direction that planning must go it also points to some of the conceptual, institutional and political-technical forces that can make river basin development inappropriate or inopportune.

I RIVER BASIN DEVELOPMENT

4. River basin development generally refers to physical regulation of a river's flow to meet the needs of water-dependent users. It has an engineering and an economic aspect. First, development usually entails construction of dams to store the daily, monthly or even yearly flows of rivers for release when required. Second, regulation operates to meet the demands of users. A regulated water supply has value directly for industrial processes, urban water supply and irrigation, and indirectly in providing hydroelectric power, protecting flood plains and in facilitating navigation. The ideally regulated river as Gilbert White wrote in 1957, "would fluctuate in its main channel only to meet fluctuating human needs, the natural variations having been evened out". 2/

5. River basin planners have more in mind than regulation when speaking of river basin development. Four concepts are generally added individually or in concert to define "integrated river basin development":

1. multipurpose projects,
2. basin-wide planning and management,
3. basin institutions, and
4. regional development.

In recent years, reflecting planning experience for major projects, more attention has been given to the goals and values that such projects are trying to achieve. "Multiobjective planning" gives a social and environmental dimension to river basin development.

Multipurpose Projects

6. In ancient Egypt, Mesopotamia, and China multipurpose projects were constructed for flood control, irrigation and navigation. Aside from these civilizations, which did not have the technological means to create much water storage, the thrust of river projects until the beginning of the twentieth century has been single purpose. Mill dams, small dams and reservoirs for municipal and industrial water needs, canals, weirs and locks for navigation were common.

7. In populated regions as demands on water grew, so did conflicts between different uses and users, and the need -- then incentive -- to make better use of abused streams and rivers. Engineers offered storage and regulation projects to avoid destructive competition for water by increasing the water supply for distribution to all users and uses. Although simple in concept, multipurpose projects need sophisticated engineering talent, large amounts of capital and a commitment to make optimal use of the river.

8. Multipurpose dam projects became feasible and worthwhile early this century with advances in engineering technologies and materials, and with an increasing demand for electricity. Large dams could be justified because the hydropower generation component provided a highly profitable return that subsidized other economically marginal project components. 2/ Dams on the Rhone River, for example, produce revenue from electricity sales which pay for the navigation and flood protection elements of the river's development. 3/ The recently completed Manantali Dam on the Senegal River will, when operating to design, be a classic multipurpose project. A regulated flow of 300 cubic meters per second downstream will permit navigation 900 kilometers upstream to Kayes in Mali, produce 800 GWH of electrical energy per year with guaranteed power of 100 MW, reduce the 100 year peak flood to that of the 10 year peak, and enable double crop irrigation of 255,000 hectares. 4,5/

9. In some countries, notably the United States, multipurpose projects became the subject of political struggle between private and public power. The logic of multipurpose projects favours public ownership. Private power firms have little incentive to incur extra costs to provide for uses like flood

protection that have no financial returns, or other low returns, but socially important uses like irrigation and navigation. Public sponsored developments, on the other hand, can incorporate the "welfare" benefits into the design of the projects and take advantage of economies of scale not available to single purpose privately financed projects.

10. Single purpose public power authorities, however, may prove no more eager to capture the non-power welfare benefits than a private power company. Scudder concludes that in Africa too many large dams are managed by agencies interested only in producing hydroelectric power, with little commitment or interest in developing other socially viable and attractive uses, such as fisheries, reservoir management for recession agriculture and grazing, and controlled downstream flooding for the same uses. 6/

11. Certainly today most river projects remain essentially single purpose, including some of the largest dams constructed in recent years such as those in the remote and sparsely populated James Bay, Labrador, northern Manitoba and northern British Columbia regions in Canada.

Basin-wide Planning

12. It is a small step from making the most of a project to making the most of the whole river, or rather the drainage basin (to include both surface and connected groundwaters).7/ Engineers like Sir William Willcocks, the designer of the first Aswan dam, early on recognized the value of multipurpose projects and also saw the complementary value of tying one project in with another. 2/ United States President Theodore Roosevelt in 1908 stated the perspective: "each river from its head waters in the forests to its mouth on the coast, is a unit and should be treated as such".2/ Development planners looked to the unique hydrological characteristics of each river to determine the physical capability of the whole river developed as a unit to meet the needs of water-dependent users.

13. For most planners the basin is the appropriate unit for thinking about development, but it is not the only one. Interbasin water transfers may be designed for hydroelectric generation, as for example in a number of regions in Canada, or interbasin transfers may bring water from water-abundant regions to water-short regions such as between northern and southern California. A number of rather large schemes have been proposed for North America, the Soviet Union and India, though in recent years the enthusiasm for such large engineering projects has faded. Most planning, however, centres on the basin. This focus would seem appropriate for Africa where most states are drained by only one or two major rivers.

14. The 1970 UN Panel of Experts report Integrated River Basin Development summarizes basin-wide planning:

> It is now widely recognized that individual water projects -- whether single or multipurpose -- cannot as a rule be undertaken with optimum benefit for the people affected before there is at least the broad outlines of a plan for the entire drainage area.

> Integrated river basin development with the aim stated involves the co-ordinated and reasonable possibilities of the basin. These may include irrigation and drainage, electric power production, navigation, flood control, water-shed treatment, industrial and domestic uses of water, recreation and wildlife conservation.3/

15. In the African context, particularly in semi-arid regions, planning must also look to land management and soil conservation. Population and other pressures on the land have put stress on forests and lands with consequent deterioration of thesoil, erosion, desertification and downstream siltation. Control of endemic diseases, such as malaria, onchocerciasis (river blindness), trypanosomiasis (sleeping sickness), schistosomiasis, must also be included in river basin planning in many basins in Africa.

River Basin Authorities

16. If the river is the focal point for planning, should not the institutions charged with implementing the programme be given basin-wide authority? Any number of organizational arrangements -- from interdepartmental committees to autonomous basin authorities -- are possible. The United Nations Panel of Experts suggested whatever the arrangements "if a river basin programme is to be integrated in more than name, it will require unified planning administration".2/ Two requirements are essential: first, provision of an organizational framework under which such unified planning and administration can take place and second, continuity in the planning, construction and operating phases. The organizational framework attractive to water resource planners is the single unified basin agency with full authority for dealing with all the basin's water and related resource problems.

17. Since the early part of the Twentieth century there have been a number of different basin institutions formed by the major water interests in the different basins. The model for the agencies is the organization for the Emscher River, the Emscherungsgossenschaft. 8/ The basin agencies develop and manage the basin for drainage, hydroelectric power and pollution control. For integrated development the Tennessee Valley Authority (TVA), discussed separately below, has been the most influential model, inspiring many African river basin commissions such as the OMVS, OMVG, Niger River Commission, Lake Chad Basin Commission, the early Volta River Commission and others.

Regional Development

18. Multipurpose basin-wide river developments require a scale of investment that alters the nature of the project. As the size of the programme increases, it loses its physical engineering orientation to an economic one directed at stimulating economic growth within the region. First, as physical development of the river advances the money spent in the region can stimulate the local economy. The multiplier effects of the investment will spread extra income and employment throughout the region. Second, the temporary increase may be sustained by new forms of economic activity, such as irrigation and fishing, and new business and industry attracted to the region to take advantage of the opportunities created by the projects, like inexpensive electricity or increased

agricultural activity. Regional economic and political interests have been quick to promote such types of schemes, particularly in the United States where the Congressional system and federal financing combine to produce conditions ripe for regional lobbying.

19. In developing countries ensuring that peoples within the basin and associated rural areas share in the benefits from river basin development is particularly important. In Africa many of the destructive environmental practices are the direct result of population pressures on the land and of poverty. "Those who are poor and hungry will often destroy their immediate environment in order to survive: They will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities". 1/

20. Regional development must be a key component in breaking this destructive cycle. Appropriately planned river and reservoir regulation has the potential to increase rural productivity and welfare through regulation of the river and reservoirs. Agricultural and grazing opportunities could be enhanced through controlled flooding and through irrigation projects, fishing could be enhanced within the reservoir and downstream, rural electrification could lead to small scale industrialization, and transportation to outside markets could be improved. It is generally recognized now that increasing incomes in rural areas where the majority of the population lives is the route to stimulating national development. 6/ But in developing countries regional and local interests tend to be under-represented in the planning and decision-making for the projects that will be located in their region. The record to date in Africa indicates that river basin developments reveal a national bias, that is an urban bias, and the economic and social benefits from the projects in the region are seldom maximized.

Tennessee Valley Authority

21. For integrated development, the United States Tennessee Valley Authority (TVA), has been the most influential model. The TVA is an autonomous federal public corporation, directly responsible to the President, with authority to plan, construct, and operate river control projects in the seven states of the Tennessee Valley. The attraction of the TVA is its independence to interpret its mandate to develop the river for purposes of flood control, navigation, and power production. The authority operates 28 multipurpose reservoirs.

22. The TVA also has less clear cut objectives that enable it to go beyond river basin planning to regional planning. Not specifically given responsibility to promote regional development, the TVA is, nevertheless, authorized to promote conservation and natural resources development; more specifically the Tennessee Valley Act mentions reforestation, development of marginal agricultural lands, and stimulation of agriculture through the sale of inexpensive fertilizers. The investments were "all for the general purpose of fostering an orderly and proper physical, economic, and social development of said areas..." (48 STAT. 69 [1952]). White points out, the TVA was not explicitly designed to occupy itself with those questions. 2/ However, once the Authority began, TVA supporters pointed to the secondary regional benefits

for high wage industries, rural electrification, the shift to non-agricultural employment and improved farm practices in the valley. 9/ Perhaps because of anti planning bias in the United States the TVA has remained conservative, seeing itself as a support agency offering financial and technical assistance for regional development goals but concentrating on main-stream regulation and provision of low cost power (at the expense of non-power programmes). 10/

23. The TVA has been the model for other basin authorities, such as the Damodar Valley authority in India, the Gal Oya Authority in Sri Lanka, and the interbasin Snowy Mountain Authority in Australia. But not many basin agencies have been given the same broad authority and responsibilities as the TVA. Competing jurisdictions and overlapping institutions with vested interests frustrate attempts to establish powerful semi-independent basin agencies. They more readily tolerate coordination and liaison arrangements, which do not threaten established prerogatives and ambitions. The built-in bureaucratic resistance makes for institutionally conservative compromises. The TVA, itself, relies on cooperation and coordination with existing government agencies to achieve the broader goals of regional development. It has divested itself of responsibility for more functionally related aspects of river basin development such as recreation, pollution control, and electrical distribution. In its institutionally complex setting the TVA focuses attention on its primary operating responsibilities in flood control, navigation and low-cost power production.

24. As an ideal, the TVA-inspired model remains alive. As mentioned above in Africa the OMVS, the OMVG, the Niger River Authority, and Kagera River Authority in some way draw on the TVA model. They are basin-wide institutions with broad planning and implementation power for integrated development. They oversee development from planning to construction. But the OMVS and other African agencies are not autonomous. Vital sectors of the integrated programme, principally complementary national developments, are beyond their control.

Multiobjective Planning

25. River basin development, particularly "integrated river basin development", gained force in the 1950s in North America and Europe. During that period of rapid economic growth, planners felt confident that physical development of water resources worked to remove constraints holding back economic growth. Their confidence was borne out in that the most optimistic projections of demand were being surpassed by actual growth. In this period, for example, about 10 percent of the annual run-off in Europe and Asia was controlled for human use. 1/ The problem was to keep ahead of demand. The cloud on the horizon was the supply of water resources to sustain the rate of growth.

26. Turning to the newly emergent nations, planners and aid agencies felt the experiences in water resource development in Europe and North America could be marshaled for application to the coming economic growth in these countries. The idea of "integrated" development was promoted, particularly in the 1960s and early 1970s through the efforts of the United Nations, but most attention was given to making use of the hydroelectric potential of major rivers for urban and industrial use; lesser attention was given to irrigation and little attention to other uses or considerations.

27. Changing attitudes and the actual experience in implementing water projects soured the enthusiasm in many quarters for large-scale projects such as Kariba, Akosombo, and Aswan in Africa. The economic returns in developing countries, particularly from hoped-for industrial expansion, were often disappointing. Also, in too many cases unconsidered social and environmental impacts that altered the hydrologic characteristics of the rivers devastated dependent ecological and social systems. River basin development rather than being a solution to the challenges of economic growth and development had become, on balance, a part of the problem.

28. The growing environmental awareness has had the positive effect of drawing attention in planning to assessing the environmental, social and other impacts both positive and negative of river basin development and attempting to incorporate non-economic or difficult-to-quantify values into the assessment and design of projects. The World Commission on Environment and Development (1987) has gone further to make the telling point that integrating these considerations into decision-making makes good economic sense. Achieving environmentally "sustainable development" is an ideal that assures benefits for this and future generations. The challenge is how to give practical expression to the ideal "sustainable" river basin development.

29. As with the concept of "integrated" river basin development the analysis of the environmental and social impacts of development are given more attention in theory than in practice. The classic economic efficiency evaluations have remained dominant with their bias towards projects that can be evaluated in terms of rates of return and net benefits to the national economy. Even where multi-objective approaches are used central planning agencies may be left to balance and interpret the evaluations under the different objectives. The reorganization of the World Bank in 1987 to give greater weight to environmental issues in assessing projects gives hope that environmental considerations are coming to be regarded as an integral part of economic decision-making.

30. At the same time there has been growing recognition in North America and Europe of the public participation side to planning of major development schemes. The public participation aspect is now increasingly regarded as being even more important in developing countries. Planning cannot be imposed from the top down. Successful agricultural projects in particular require the commitment and initiative of the people to make them work and this requires special attention to creating the institutional and economic conditions that respond to their needs.

31. Equity considerations must be addressed. The regional development dimension must have equal standing so that development does not proceed without the peoples most affected being given the opportunity to defend their interests and have a say in their future. Scudder provides a definition of development in this context: "development occurs when production, incomes, and living standards for large numbers of people increase at local, regional, and national levels in a fashion that is environmentally sustainable". 6/ In other words "projects which transfer resources in the form of hydropower to the national (indluding across national boundaries to other nations) level at the expense of regional, local, and environmental levels are not considered development, irrespective of short-term national accounting as measured by economic rates of return".

32. The shift away from physical development to broader sectoral goals and the more environmental and human side of development entails pursuit of a number of objectives. River basin development is promoted as a tool for socio-economic growth, both at a macro and micro level. No longer are goals simply growth and the projects judged in terms of efficiency criteria. Water development is a means to accomplish a number of objectives and more explicit recognition is given to equity question.

33. Multiobjective planning should be compatible with developing counties' aims. Growth and development are overall goals that encompass a number of objectives concerning human welfare and the nature of the economy that must be satisfied before growth and development can be sustained. Nevertheless, the belief of the 1950s, nurtured in the relative success of physical development programs, such as for the Tennessee Valley, Columbia and Rhone, that construction of works to regulate a river will stimulate regional growth remains strong. The belief is reinforced by certain political and institutional dynamics that will be discussed below. Belief in the new planning approaches, stressing environmental impacts, appropriate technologies, socio-economic transformation and environmentally sustainable development, are of growing importance but less firmly rooted.

II. RIVER BASIN DEVELOPMENT IN DEVELOPING COUNTRIES

34. As river basin planning evolved, it focused increasingly on the impact the projects have on regional development. This has led to a more careful examination of the objectives implied by regional development, which in turn forces re-examination of river basin development as a means to achieve those objectives. As the objectives become broader incorporating local, social, regional, national and environmental objectives they become less tied to a single means to achieve them. This suggests evaluation of river development as one alternative strategy.

35. It is not obvious that a labour extensive, capital intensive, hardware-based approach to integrated river development is necessarily the best alternative for poor countries to adopt as a first step to regional development. The approach as developed in North America, Europe and Australia to bring the infrastructure projects to life presupposes a fairly high level of producer response, skill education, communication networks, rural-urban linkages, credit facilities, extension work, price incentives, responsive decision-making, and institutions of all kinds -- in effect, the objectives many poorer countries would like the river projects to achieve.

36. A number of differences between river basin development in wealthy countries and in most poor ones makes poorer countries less responsive to the opportunities provided by river projects.

(i) Developed countries tend to be economically much more homogeneous than developing ones. Multipurpose planning in developed countries can proceed with the fair assumption that benefits will be spread throughout the target area. But in developing countries, where there may be a mix of traditional and modern and great inequalities in income, education, employment opportunities, etc., river projects become too often one more element of the modern sector that increases inequality. In such dual economies planners and developers focus on the modern sectors in which they can foresee a return. 11/

In the African context the integrated river basin model has in many cases been disregarded in the pursuit of essentially single purpose developments, in practice hydroelectric projects. The integrated development ideal may be acknowledged, but in practice the focus on generation of electricity has led to the neglect of other development opportunities in agriculture, fisheries, forestry and transportation, and left the peoples in the traditional economy in valley and surrounding countryside with resulting environmental degradation, dislocation and difficulty in maintaining even their subsistence way of life.

(ii) Planning is a much more complicated process than in developed countries and is likely to strain the financial and human resource capabilities of a developing country. But in developing countries capital and human resources are in much shorter supply. This necessitates dependence on foreign assistance to advance projects which, as is discussed in the next section, adds a new dimension to the planning and implementation. The shortage of financial resources may also mean inadequate planning and preparation, underinvestment in certain areas, and the inability of government agencies to provide the appropriate level of institutional, technical, fiscal, and financial support to maintain the projects.

(iii) In developed countries, river basin projects are a means to promote economic growth. Planners can assume a population that can adapt and take advantage of the services and opportunities provided by river basin projects. In developing regions, river projects in themselves are unlikely to promote growth for the constraints on development in poorer countries often turn out not to stem from lack of river regulation, but from the socio-economic conditions of the traditional society of the target market groups and the political-institutional weaknesses of the national governments. In other words the constraints on economic growth are human. The prerequisite to physical development in poorer countries is the social and economic capability to make use of such development. This suggests attention must be given to the education, incentives, community participation, backup services, and financial resources needed to engage the people more effectively in the development process, which in effect means improved agriculture through irrigation and controlled flooding, livestock management, fisheries development and other forms of water and land use.

37. The differences between conditions in developed and developing countries need to be considered before applying river development models. Ill-suited river basin planning in the developing country context is often resource or supply-oriented. It assumes a demand for river regulation. In other words water or the services water projects can provide are seen as the bottleneck in the way of development, whereas the bottleneck is the poverty and inability of the people to make use of the projects.

38. A region may be handicapped, like the Sahel, by lack of steady irrigation water supply, high energy costs, poor transportation, and periodic devastating floods or low flows. Engineers and planners look to construction of river basin projects to provide the means to alleviate those problems and are confident that the market for the project services, if not already there, will quickly develop to take them up and provide a return. In developed economies this physical approach often works. Hydroelectric generating capacity may temporarily be ahead of demand, but growth in the region quickly consumes the excess and the power component of the project become profitable. Although even here the approach is under attack from environmentalists and critics of unrestrained growth, who feel too much emphasis is given to meeting unquestioned projections without consideration of alternatives that may dampen demand and better reflect other values held in society. Irrigation in arid regions may also meet immediate consumer enthusiasm as farmers take advantage of increased water supplies to bring new lands under cultivation.

39. In developing countries there is a need to do something: to expand the productive capacity of land in arid regions through irrigation, to make the agricultural sector more productive to relieve the burden of paying for imports of basic food stuffs, to supply power for rural electrification and for urban and industrial growth, to improve transportation. But if the groups in need cannot make use of the services water projects provide there is no adequate demand. As a result projects built to satisfy very real needs stand in danger of going unused by the people they are designed to benefit, because they may lack the means -- education, resources, support or incentives -- to make use of them.

40. River basin development should emerge from the identified demands and needs within both the river region and the national economy in which it is to be placed. That means identification of the constraints that hold back development, particularly in the traditional societies, and an appropriate response to remove them. In this context, large mainstream infrastructure projects may be appropriate only under certain conditions. Some of these conditions are suggested below.

(i) River basin development projects may be suitable where there is an identified demand within a region for some aspect of river basin development and the failure to satisfy that demand is constraining economic growth. For example, farmers have made maximum use of the unregulated river and can increase production greatly through a secure regulated source of water that will permit double or triple crops. In other words water is the real bottleneck to growth.

(ii) The technology of river basin development should be appropriate to the socio-economic structure and values or the latter will change to accomodate the technology. In many parts of Africa, for example, irrigated agriculture requires settlement by people unfamiliar with the technologies, disciplines and other requirements of this, to them, new form of agricultural production. The situation is quite different in many parts of Asia where there is familiarity with irrigation, and the people can readily adapt to major new irrigation projects. Where this experience is lacking irrigation schemes may be inappropriate until such time as the farmers have acquired the skills,

(iii) The environmental impacts of the technology or projects should not undermine the productive capacity, or ecological base, of the peoples and the region to sustain long-term development. In many river basins in Africa flood recession agriculture is practiced. Regulation of a river to eliminate the annual floods may also eliminate the productive base for the people dependent on the flood. The plan for the Manantali Dam on the Senegal River offers an innovative alternative. The Dam will produce an artificial flood to permit continuation of flood recession agriculture for a period of transition before commencing full regulation to take advantage of the hydroelectric potential and serve downstream navigation. The regularized flood could substantially benefit the people downstream and could hasten the transformation of the society from dependence on traditional flood recession agriculture to irrigated agriculture.

(iv) There need to be in place flexible institutions capable of managing and maintaining the technology, and responding to the needs of affected populations. In other words there must be community participation and people in the valley must have the confidence to turn to their local development institutions for support, rather than treating them as alien and disruptive.

(v) There need to be financial or economic incentives to make use of the technology. If agricultural production increases from the farmer's use of irrigation the farmer will receive a fair market return, and not have his gains levied away by cooperatives or marketing organizations. The heavy hand of parastatal irrigation and marketing organizations and the political commitment to inexpensive basic food stuffs for urban areas has in many cases been iniquitous and stifled rural initiative.

(vi) The projects generate surpluses and technical knowledge on a self-reliant and sustained basis. 1/ Financing and recurrent costs can be met and participants can learn and pass on their knowledge. State governments do not have the resources nor the capability to sustain projects once they are launched. For projects to be successful the state should be able to recover its costs and then withdraw to let the organizations and participants maintain them. Successful projects will generate their own momentum leading to expansion or replication. 12/

(vii) Sufficient capital should be available for water development and complementary works. Projects are well designed and constructed for the long-term. The lack of capital too often leads to underdesigning projects, for example, inadequate drainage and inadequate levelling for irrigation projects.

(viii) Adequate rural-urban transportation routes need to be in place or developed as a complement to river basin development. If surpluses are to be generated from increased agricultural production, livestock raising or fisheries, the commodities must be able to reach markets. In addition, the rural communities need to have access to the services and goods from the urban centres to be able to maintain their projects.

III MULTIDONOR FINANCING FOR RIVER BASIN DEVELOPMENT

41. The existing level of funding for water resources planning, irrigation and drainage, supply and sanitation and other uses is a small fraction of estimated requirements. Poor countries have a responsibility to order their own funding priorities to give greater effort in this sector. But, handicapped by heavy external debts and little revenue, they do not have the financial and technical resources to solve the problems themselves. Foreign assistance from bilateral and multilateral institutions is essential. For river basin developments entailing large projects, the capital investments may be beyond the willingness of any single donor. With capital costs of irrigation rising upto $20,000-$30,000 per hectare and regulation dams costing from $100 million to $800 million multidonor consortiums have become critical to achieving the level of capital investment to implement major projects. 6/

42. As the financial investment to build river projects will be large the recipients have to find a number of donors to support them. From the Senegal experience and the efforts of certain multilateral development agencies, in particular the UNDP, a multidonor multidisciplinary approach has evolved to interest donors in such development and associate donors with recipients in a long-term development process.

43. With the UNDP acting as a catalyst and providing some of the initial funding and technical and institutional support to initiate the process, multidonor financing may consist of the following phases. 1. The resource potentials of the basin are mapped out through hydrological, soil and other physical studies, potential projects are identified, the existing socio-economic and environmental conditions and needs within the basin are surveyed, and problems and further information needs are identified. From the basic data gathering and study phase the broad alternative lines of development, or an indicative plan, are sketched out. 2. In the evaluation and assessment phase feasibility studies are undertaken of possible projects, alternatives assessed, investment needs and priorities determined, institutions strengthened and in general the stage is set for presenting proposals to attract donor investment. 3. In the financing phase further studies are carried out to meet the requirements of donors and to elaborate on weaknesses in information identified from the earlier stages. 4. Prior to and during the implementation phase attention focuses on financing for needed complementary or stage-two projects and on making the projects work in the social, economic and environmental milieu in which they are being constructed.

44. In practice the process can be cumbersome. For example in the Senegal case upto 25 organizations and 100 representatives attended many of the early meetings in the mid-1970s. In such circumstances the delegates could not give the attention needed to settle the issues the OMVS put up for resolution. The meetings were generally held at yearly intervals or longer. Between meetings the preoccupations and views of the donors changed and the work of the OMVS was out of synchronization with what the donors were expecting of the organization. Most of the meetings were held at cross purposes. The OMVS wanted to resolve the issues on the agenda while the donors remained preoccupied

with issues they felt the OMVS had not addressed properly, but they offered little positive direction and guidance. The donors' role was reactive and indirect. The donors responded to the OMVS proposals and then the OMVS had to amend them to suit or circumvent donor criticisms. 13/

45. Much has been learned from the pioneering effort that went into the Senegal projects to streamline and make more productive multidonor consortiums. Nevertheless, there are pressures at work that make it difficult to achieve the type of multiobjective development discussed in Section I. As noted, the ideas are in place, but the commitment could be stronger. Some of the problems arise from reconciling the many different motives, concerns and interests among donor and recipient alike. While a shared general interest in improving the welfare of a region or a specific interest in river basin development may bring all the parties together, in the process of accomodation many of the principles developed earlier may not be given full recognition.

Physical Bias

46. Recipient and donor share a bias in favour of physical infrastructure projects that works against consideration in planning of multiobjective regional development.

(i) In politics, leaders need to be able to demonstrate that they are working for the benefit of their constituency. When faced with alternative means to achieve the same objective they will select the alternative that symbolizes most clearly their efforts. That is, they will favour physical projects over non-physical ones.

(ii) In planning, non-structural alternatives are based on many social features such as changes in attitudes, training, etc. that call for interpretation, judgement, and flexibility -- qualities at a premium in any organization, let alone expertise-poor ones in developing regions. The greater the technological component of a programme the more specific can be the objectives, the more precise the requirements, and the more detailed the operating procedures, with the result that there is less chance of the programme going astray. A hydroelectric dam is much more likely to be a success in its own terms than an irrigation project, even though the dam, generating plant and transmission facilities are much more technologically complex. Planners will, thus, tend to favour solutions to regional development that have a high tehcnological or engineering component over which they can be assured of control.

(iii) River basin development is cross sectoral in approach but many aid agencies have tended to examine river basin projects in sectoral energy or irrigation departments. This institutional bias is reinforced in recipient states where the river basin projects are planned by energy, public works or other single function agencies. Sectoral examination may lead to over rigorous technical evaluations of the hydroelectrical component or irrigation command areas, with inadequate attention to broader regional development objectives and impacts, such as the potential to develop the fisheries behind a reservoir or the negative downstream environmental impacts on a particularly unique or productive estuarine ecosystem.

(iv) In the field of foreign assistance, many donors tie bilateral aid to goods and services their own economies can provide. These tend to be capital intensive and technological. Such bilateral donors favour capital intensive alternatives that support domestic interests, like consulting and construction engineering firms.

(v) In multidonor financing, some of the investment funds available will be from multilateral agencies, such as the World Bank, or from other development funds, like those from the OPEC states, which have no tied aid element. The large sums of untied assistance provide an incentive for other donors to participate in the financing in order to capture a share of those funds for their own export sectors. These donors may thus be more concerned with ensuring high domestic returns for their contributions than in ensuring that the most economical use is made of the investment funds for the development projects.

(vi) When financing is offered to states as grants or on highly concessionary terms the recipients may regard the investment funds for their development projects as benefits, not as costs to be minimized. Thus the basin states will have little incentive to economize in the design of the development projects.

Planning Studies

47. Pre-investment studies are a requirement to ensure appropriate planning. But from the donor's and recipient's view alike this planning stage can produce 1. too many reports, 2. the wrong kinds of studies, and 3. reports of little use to the recipient countries. 6/

48. It is clear that the general pressures in favour of physical development can account for many inappropriate studies and weaknesses in the generation of the right kind of information. The large number of studies reflects the number of agencies involved, their views on the information that should be produced and their evaluation requirements for deciding on whether or not to invest. Funding for studies can be quite generous. The outcome is an array of studies designed to provide different types of information, which are often produced without any overall strategic purpose in furthering the planning process and which may be commissioned without the interest or support of the recipient.

49. A constant theme running through the history of development projects is the tension between donor and recipients arising from conflicting interpretations of what the projects are supposed to accomplish. Generally aid agencies, especially international ones, will have a developmental perspective through which to view the support and design of projects. Although the recipients also have developmental perspectives, the two are not necessarily the same. The agencies view projects as technical problems that can be solved if they meet technical criteria, such as internal rates of return, benefit-cost ratios, or other evaluation criteria. But for the recipients the projects they favour may be the only ones politically acceptable or desirable.

Information exposes their political compromises to the scrutiny of foreign officials who may be unresponsive to domestic political conditions. Political leaders may attempt to circumvent the unfavourable results of technical evaluations by securing direct political commitments from donors.

Expertise

50. Most developing countries turn to aid agencies for the expertise to assist with the necessary pre-investment and design studies, and later with implementation and operation of the projects. For major water projects the professional component is high. Rivers are interconnected and interdependent systems of surface and subsurface waters, land, people, ecosystems and other elements that bear on planning for development of a basin. To understand the systems and to devise plans for action requires a comprehensive perspective and demands a multidisciplinary and interdisciplinary professional approach with disciplines represented as varied as civil engineering, sociology, anthropology, meteorology, international water law, contract management, economics, geology, statistics, systems analysis and others.

51. Experience points out the problems of using foreign consultants -- their cost, disinterest in training counterpart personnel, lack of familiarity with local conditions, tendency to recommend over-optimistic and over-ambitious proposals, the superficiality of many of their studies, and the lack of continuity between short-stay consultants, language problems etc. Scudder and others also point out the difficulties of using outside assistance in the delicate task of promoting community initiatives. 6/

New Directions

52. The donors need to take some initiative to make multilateral cofinancings more efficacious. It may mean shedding some of their bankers' reticence and becoming more heavily involved in shaping worthwhile proposals. To make the process more manageable for a major development proposal a few of the principal interested donors -- including at least one leading international financing institution, preferably the World Bank -- could take the initiative by forming a steering committee. The committee would liaise between the recipients and the donor community, and determine the types of information the donors required, the conditions the recipients would have to meet, and the various terms for the loans. Once the committee was confident in the proposals, it could assist the recipients in soliciting the balance of the funds needed to complete financing. The committee would meet regularly with basin state organizations to inform them of donor requirements, to learn of their problems that might require donor assistance or modifications to financing conditions, and to identify issues that might require the attention of a full donors conference or political resolution among political leaders.

53. Perhaps the donors could learn from the syndicate arrangements international bankers use to provide loans to governments, in which some bankers take the lead and raise support from other banks to complete financing. Development assistance is more complicated because the terms of the loans -- having to

incorporate tied aid -- are more varied. The recipients may well not be happy with such types of funding arrangements for they reduce their flexibility in securing funding for proposals that are not economically well-founded and they may see such funding consortiums as a threat to their sovereign authority to formulate policy as they see fit. None the less, if they do have a good basis for their plans the approach should improve the prospects of the recipients receiving helpful support and prompt funding.

IV INTERNATIONAL RIVERS

54. Prior to 1960 the political map of Africa was less complicated. Rivers fell within the suzerainty of a single colonial power or at the most two. For example, though Britain exercised different degrees of authority over the Nile basin (aside from Ethiopia and the Belgian colonies) the Egyptian Irrigation Service, largely composed of British engineers, was considered to have an "informal protectorate" over the whole basin. 14/ With independence African rivers lost their relative administrative simplicity and in some cases, like the Niger and Nile, were divided among as many as nine different countries. Africa now has 57 international rivers, which cover 60 percent of the continent. 15/

55. A planner who looks only to his country's section of the basin will find some development possibilities. But generally the net benefits from his plans and the plans of the other basin states summed will yield total net benefits less than what might have been achieved by planning as if boundary lines did not exist. Storage dams permit increases in hydroelectric output downstream through run-of-the-river dams. Storage upstream provided at little extra cost may also yield substantial benefits from flood prevention, irrigation and improved year-round navigation. If the upstream states are not in a position to reap any of these benefits, projects designed only in terms of the internal domestic economics, if built at all, would be of a much smaller scale. Integrated development provides an incentive for the basin states to benefit from economies of scale. Since the total net rewards of development through cooperation. In the process of cooperating basin states may also improve relations within the basin and achieve regional political stability -- no small benefit in regions of Africa where economic and political integration remain an ideal.

56. Despite the economic incentives to cooperate the technical, legal, institutional and above all political difficulties in the way of successful common development are formidable. The United Nations has done much to identify these difficulties and the means by which states have overcome them. 7, 16, 17/ Equally of value are the efforts through the International Law Commission to create a body of international law and practice, based on the concept of equitable utilization, that promotes recognition of the rights of each basin state to waters of a basin. Acceptance of common principles lays the foundation for various forms of international river basin cooperation from consultation through to common development. 18/

57. Most donors have no explicit policy for encouraging international integrated river basin development. The United Nations and the European Development Fund are exceptions in that they do have policies to encourage regional cooperation. In line with the EEC's own integrationist philosophy, the European Development Fund has a special allocation to support regional projects. The Senegal basin states are benefiting from that allocation by about $90 million. The United Nations Secretariat has long regarded river basin cooperation as an area of special interest in which the United Nations could have a special role. Compared to other donors, the United Nations, through the UNDP and other agencies like FAO, generally contributes only a small amount to river basin development. But the United Nations' role is as a catalyst. The United Nations agencies' initial support of planning in many African rivers has been critical in supplying the basin states with credible information and plans and institutional support with which the basin states could solicit financing for the projects.

58. There is a planning bias in focusing on the international dimension. Planning to meet common basin states' needs through exploitation of the shared resource may lead to inadequate attention to the socio-economic and environmental conditions in the valley and the economic conditions of the states themselves. By concentrating on the resource in the first place the approach that follows tends to be development of the river. River regulation, as suggested above, is at first only one of a number of options. The overlap of interests among the states should be put in the context of the wider problems of development within the basin and the states. The emphasis shifts away from the river to the needs and objectives of the basin states.

59. The states individually require the technical and financial capability to compare the net benefits to them from international cooperation against the net benefits from national alternatives. Assistance should then be directed at creating that capability at the national level. Politically, the approach is acceptable as states generally prefer direct bilateral assistance to assistance shared with neighbours.

60. The preliminary planning should include at least the four following steps: 1. Careful elaboration of national basin problems and national economic problems as the basis for selecting development objectives; 2. an indicative plan of the river's potential that can suggest alternative river projects; 3. consideration of alternative non-regulation schemes to assess the scope for national efforts to meet the objectives; and 4. comparison of international schemes with national ones to determine the most economic and most feasible alternatives.

International River Organizations

61. Central to any international cooperation are the institutional arrangements the states devise to implement the agreed programme. Such arrangements range from rudimentary commitments to exchange basic hydrologic data to basin-wide commissions with almost supranational authority to develop and manage a river. 7/

62. For integrated development the institutional structures vary, but the river basin organization or state agencies must work together to collect data, identify suitable projects, elaborate indicative plans for the basin, produce feasibility

studies, secure financing, construct the projects, operate them, and mediate disputes among the contracting parties and users. International river basin institutions, if designed carefully, are not much of a source of controversy; but their ability to function can be seriously hampered by tensions within the basin. The amount of paid-up contributions of the members to meet the budget, the level of activity, and the morale of the commission are indicators that reflect the level of commitment of the member states to the organization and its objectives. Good institutional design cannot overcome a fundamental lack of political will to sustain an organization; but good design is necessary, nonetheless, to withstand less fundamental shifts in commitment and tensions that emerge among the member states.

63. Governing political councils direct the OMVS, OMVG and a number of other river development organizations in Africa. The members are cabinet level politicians, who meet regularly to make policy and scrutinize the work of the international secretariat that performs the data gathering, planning, implemntation and operating functions. Periodically the presidents of the basin countries meet to reaffirm their national commitments and ratify fundamental new policies. For day-to-day supervision between meetings, one of the ministers is nominated, by rotation, to oversee the executive. Similarly for the OMVS and OMVG one of the presidents is nominated as president of the commission. The chief executive of the secretariat is an executive secretary or, in the OMVS and OMVG, a high commissioner.

64. The level of political involvement reflects the fact that international agencies performing tasks that have fundamental policy implications, for the basin states cannot carry out those tasks without some commitment from the states to make the necessary domestic changes and to coordinate their policies. The council of minister meetings in effect serve as forums for inter-state negotiations to devise new policy for their own governments, as well as for the operation of the commission. The ministerial scrutiny also enforces accountability on the international civil servants.

65. The type of work required has an inherent tension between the political authority needed to implement effectively the tasks mandated to an international organization for integrated river basin development and the legitimate sovereignty interests of its member governments. Is the organization's authority to be entirely directed and delegated or is it to have some latitude in making policy that binds member governments? For strictly routine and functional tasks, the problem does not really arise. But integrative development among poor countries requires more than just building a physical infrastructure; as discussed, it needs considerable associated socio-economic work to build up the demand for the services the infrastructure can provide.

66. The international river agency stands or falls on the basis of how its mainstream projects are used -- but it has little control over associated development such as irrigation. It has the interest and may have some of the technical and financial means (as a recipient of financial and technical assistance). But associated river basin developments will be the province of member governments' departments and agencies. They will not yield easily their

jurisdiction, even though their responsibilities may be nation-wide and cannot give the same attention to the basin projects as the river basin organization. The governments themselves quite legitimately may also be reluctant to cede responsibility, for implementation of such projects can be politically sensitive and it is they, not the basin organization, who are ultimately accountable. The basin organization can only be indirectly accountable through the ministerial council. Governments have little reason to think that by loosening the reins on an international bureaucracy it will behave more responsibly than themselves. As a consequence international river organizations may find the most politically acceptable position in simply implementing and operating the mainstream regulation works. Successful international river basin development elsewhere, such as for the Columbia, the St. Lawrence, Indus, the Rhine, and the Rio Grande, has been accomplished without elaborate and formal international river organizations. Most states prefer minimal international organization and are careful not to allow the organizations they do create mandates that might be expanded into areas of supranational authority.

67. The emphasis on national institutions does not imply any less effort to facilitate greater inter-state communication, consultation, coordination and cooperation. Projects undertaken piecemeal without reference to needs, potentials, and consequences in neighbouring states are a certain recipe for tension, controversy and lost potential. International arrangements have to be put in place. The exact arrangements will depend on the type of development the states undertake. But the issue areas can be divided into: 1. generation of commonly agreed upon facts and information; 2. identification of, in order of each state's priority, the projects they want to undertake; 3. if costs and services of projects are to be shared, the funding for the projects; and 4. allocation of water, services, costs and benefits among the different states and users; and 5. resolution of disputes arising from use and development of the river.

68. If the basin state governments have strong administrative capabilities, most of the tasks can be undertaken by ad hoc working groups. However, the allocation and dispute-resolution functions might be best performed by a permanent inter-state commission, such as the Permanent Water Commission for the Senegal. Depending on the preferences of the basin states it could operate like the present OMVS or OMVG Council of Ministers, that is as a forum for inter-state negotiation. Or it could function more radically as a collegial body dedicated to arriving at equitable solutions to problems submitted to it by the states, like the International Joint Commission between Canada and the United States. 10/ In either case the commission would benefit from a small international secretariat. The secretariat could also serve as the clearing house for data and information collected by the states on the river and assist the inter-state working groups. Institutional arrangements for an international river might at a minimum include a negotiating or quasi-judicial allocation and adjudication commission to be created on a permanent basis to settle issues submitted to it by the states arising from the development and use of the international river. The commission should be supported by a small permanent international secretariat that would also collate and disseminate information regarding the river collected by the basin states, serve as the administrative centre for basin-wide studies conducted by ad hoc working groups of national agency officials or internatinnal consultants, and assist in common fund raising efforts of the states.

V CONCLUSIONS

69. The concepts of multipurpose projects, river basin planning, river basin institutions and regional development that are associated with river planning provide a useful perspective for tackling many of the water related issues that face Africa. They are particularly worthwhile in pointing to the value of water and the need to optimize its use. These ideas remain central to river basin development. Nevertheless, this basically resource-oriented infrastructure-based approach that focuses on river regulation needs to be put in the context of the human and environmental side of development and consequent consideration of the objectives river projects are trying to achieve.

70. Environmental conditions arising from water not being in the right place, in the right quantity and at the right time can impede growth and the variability of climate can have tragic effects. But river basin projects in themselves cannot remove those constraints. Such development must be based on, or accompanied by, transformation of the societies within the basin and rural areas so that the benefits or regulation can be taken up. Physical development needs to emerge from the demands of the people in the region as well as the more general needs of national governments.

71. In practice a number of forces work to give disproportionate emphasis to the physical development side of the equation. Major development projects in Africa and other developing countries are the product of the interests of many donors and the states themselves. Common ground is found more often in physical infrastructure projects than in regional development *per se* or in consideration of environmental concerns. The challenge is to broaden the common ground so that the multiobjective dimension of river basin development can be given greater consideration.

72. Many rivers are shared by more than one country. In Africa the international dimension of river basin development is particularly important as so many major river development opportunities are for rivers share by a number of countries. Failure to cooperate leads to lost opportunities to optimize the economic benefits from development and possible tensions and conflict. International river basin cooperation can do much to promote regional development and encourage good basin state relations. But such harmony can only be achieved if the basin states are committed to cooperative approaches to development and if the outcome of their efforts give them a sustaining incentive to keep working together. The imperative is to design river basin projects that will be over the long term economically, socially and environmentally self-sustaining.

REFERENCES

1. World Commission on Environment and Development (WCED), "Our common future", Oxford University Press, Oxford, UK, 1987 (see page 28-29, 32, 65)

2. Gilbert White, "A Perspective of river basin development", Law and contemporary problems, 22, 1957. (see pages 163-168)

3. United Nations, Integrated river basin development: report of the Panel of Experts, New York, 1970, (E/3066/RCV 1). (see page 3)

4. Marches Tropicaux et Mediterraneens, "OMVS: the development of the Senegal River", 17 April, Special issue in English (also in French), 1981

5. Marches Tropicaux et Mediterraneens, "OMVS: un avenir pour le fleuve Senegal", 20 mars, pp 677-688, 1987.

6. Thayer Scudder. Background document prepared for the May 24-27, 1988 Conference on the African Experience with River Basin Development: achievements to date, the role of institutions and strategies for the future, draft March, 1988.

7. United Nations, Management of international water resources: institutional and legal aspects: report of the Panel of Experts on the legal and institutional aspects of international water resources development, New York Natural resources/water series no. 1, 1975 (ST/ESA/5).

8. Ludwik A. Teclaff. "River basins in history and law," The Hague: Maritinus Nijhoff, 1967.

9. Gordon R. Clapp, "The TVA: an approach to the development of a region," Chicago: University of Chicago Press," 1955.

10. Vincent A. Ostran, "The role of public and private agencies in planning the use of water resources" in Land and Water: planning for economic growth, H.L. Amos and R.K. NcNickle eds., Westport, Conn.: Greenwood Press, 1962.

11. Aaron Wiener, "Analysis of the impact of water resource development on the national or regional economy" in River basin development: policies and planning: proceedings of the UN Inter-regional Seminar on River basin and Interbasin Development, Vol. 1, pp 53-61, New York, Budapest, 1975.

12. E. Fano and J. Thompson, "Rural water resources management in developing countries: strategies for improving investments at the project level", Paper presented at the Sixth IWRA World Congress on Water Resources, May 29-June 3, Ottawa, 1988

13. David G. LeMarquand, "International development of the Senegal River" D. Phil dissertation, Oxford University, 1982.

14. A. Garretson, "The Nile Basin" in "The law of international drainage basins," A. Garretson, R. Hayton and C. Olmstead, eds., Dobbs Ferry, N.Y.: Oceana, 1967.

15. United Nations, "Register of international rivers", Water supply and management 2(1), 1978

16. United Nations, Experiences in the development and management of international river and lake basins: proceedings of the UN Interregional Meeting of Internatinal River Organizations, Dakar, 5-14 May 1981, New York: DTCD (DTCD, Natural resources/water series no. 10, 1983 (ST/ESA/120).

17. United Nations, Instututional issues in the management of international river basins: financial and contractual considerations, New York: DTCD, 1987 (DCTD/1WL/1).

18. United Nations. Report of the International Law Commission on the work of its thirty-eighth session, 5-11 May 1986, Official Records of the General Assembly, forth-first session, supplement no. 10, New York, 1986, (A/41/10).

19. David G. LeMarquend, "Canada-United States relations: The 1909 Boundary Waters Treaty and the International Joint Commission", Transboundary Resources Report, 2(1): 4-5, 1988