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CONSULTANT'S REPORT ON THE
DEVELOPMENT OF A PLANNING CAPABILITY FOR THE
GAMBIA RIVER BASIN DEVELOPMENT COMMISSION (OMVG)

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SUMMARY

The purpose of this report is to help the United States Agency for International Development carry out its project No. 625-0012 which was authorized in 1981 to assist the Gambia River Basin Development Commission (OMVG) in planning for the development of the water and related land resources of the Gambia River Basin.

The first part of the report describes the evolution of river basin planning in the United States. It shows how the planning concept changed, from one directed primarily toward finding structural solutions to water resource problems, to include land use and watershed protection for the purpose of water flow retention and soil erosion prevention, and eventually to the present concept of water resources management as opposed to water resources development.

Early planning for the Gambia River Basin followed the original pattern established in the United States, with the emphasis on water resources development. Thus OMVG was created to coordinate the construction of water development projects in the Member States. As experience in other African river basins has been gained, it is becoming more and more obvious that OMVG must take a broader view of water management in the Gambia than merely considering the construction of dam and other water control works. Fortunately the treaties and conventions under which OMVG was established contain provisions for a Permanent Water Commission (PWC) with authority to look at the broader aspects of water management.

USAID has undertaken a project which provides assistance to OMVG through the provision of expatriate experts and the training of counterpart experts to carry on the function of planning for the management of the water and related land resources of the Gambia River Basin. These experts make up the Planning Unit of OMVG.

To assist the OMVG in developing its ability to carry out the river basin planning process the report contains recommendations for the adoption of a work plan for the Planning Unit comprising the following steps:

1. Establishment of liaison with and training staff of ministries and agencies of the Member States;
2. Formulation of goals and objectives for the Gambia River Basin;
3. Data collection and analysis;
4. Problem identification;
5. Development of simulation models;

6. Proposal of alternative solutions to problems;
7. Preparation of reports and inviting comments; and
8. Revision of reports to take account of comments and submit for approval.

In addition specific studies are recommended in the following areas:

- o Salinity barrier
- o Relationships with OMVS
- o Cost sharing and reimbursement
- o Water rights

At the present time, primary emphasis should be placed on the acquisition of data to permit development and use of simulation models for assessment of the effects of proposed development and management scenarios. Work on the hydrologic model is well underway and should be continued along the lines presently contemplated. Considerably more effort and data will be required before environmental and economic models can be effectively used and caution should be used in interpreting the results of model studies based on the meager data that is available.

The report concludes with eight recommendations, adoption of which the author believes would advance progress toward sound development of the resources of The Gambia River Basin. In addition to the recommendations for approval of the work plan and undertaking studies in the specific areas listed, recommendations are included for implementation of the Permanent Water Commission to assist in the planning and review process, establishing a West African river basin research center, and developing better facilities for exchanging information on problems and progress in other river basins.

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CONSULTANT'S REPORT ON THE
DEVELOPMENT OF A PLANNING CAPABILITY FOR THE
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June 1986

FOREWORD

On May 27, 1981, the Administrator of the U.S. Agency for International Development (USAID) approved The Gambia River Basin Development Project, Project No. 625-0012, for the stated purpose of helping to establish an effective planning division within The Gambia River Basin Development Organization (OMVG). Obligation of not more than \$13,394,000 in U.S. funds was authorized for the project, with a completion date of September 30, 1986. Under this authorization, aerial photography and maps of the basin were produced and environmental and socio-economic studies of proposed developments conducted. As the work progressed, an additional \$1,500,000 was provided and, following a mid-term evaluation of the USAID project in May, 1984, the project was amended to extend the completion date from September 30, 1986 to December 31, 1987, and the total funding was increased to \$16,894,000. RONCO Consulting Corporation was engaged by USAID in 1984 to provide expatriate experts (1) to provide technical research and analysis for OMVG, (2) to foster the establishment within OMVG of the capability and institutional arrangements for promoting effective region-wide resources management, and (3) to assist OMVG contractors in the accomplishment of their tasks.

Provisions were made under the RONCO contract in 1984 to provide a full-time economist, and in 1985 to provide a river-basin planner and an hydrologist. Additional short-term consultants are being provided in the fields of economics and hydrology to assist the full-time expatriates.

The author of this report was engaged by RONCO in April of 1986 to support the activities of the full-time river-basin planner.

The report is in three parts, first, a brief discussion of the history and evolution of water resource planning in the United States, next a description of the mission of OMVG and the involvement of USAID, and finally, a more detailed discussion of the work of the OMVG planning unit with recommendations for improvement of the planning process.

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Any errors in fact, misinterpretation, or omission are those of the author, for which he accepts full responsibility.

ABOUT THE AUTHOR OF THIS REPORT

Theodore M. Schad received a degree in civil engineering at The Johns Hopkins University and has over forty years of experience in natural resources engineering and policy. After fifteen years in planning of water resources projects with the U.S. Army Corps of Engineers and the Bureau of Reclamation, he became principal examiner for water resources in the U.S. Bureau of the Budget. After this, he was employed by the Library of Congress as a consultant on engineering and public works to members and Committees of Congress, and later, as Deputy Director of the Congressional Research Service. He served as Staff Director to the U.S. Senate Select Committee on National Water Resources from 1959 to 1961, producing a report which led to the enactment of the Water Resources Research Act of 1964 and the Water Resources Planning Act of 1965. From 1968 to 1973, he was Executive Director of the National Water Commission, following which he served successively as Executive Secretary of the Environmental Studies Board and Deputy Executive Director of the Commission on Natural Resources at the National Research Council. After retiring from that position in 1973, he has been a consultant on several studies and served as Executive Director of the National Ground Water Policy Forum at The Conservation Foundation.

PART I - BACKGROUND

A. Authority for the Report

This report on the Development of a Planning Capability for OMVG is prepared as a part of USAID Project No. 625-0012, in accordance with a Memorandum of Agreement dated April 10, 1986 between the author and RONCO Consulting Corporation and in furtherance of RONCO's Contract No. AFR-0012C-00-5001-00 dated November 2, 1984, with USAID, Regional Operations Division, Africa.

B. Purpose of the Report

The purpose of this report is to assist USAID/Dakar, and the team of expatriate advisors to the OMVG Planning Division in the development of a work plan for the balance of 1986 and through December, 1987, that will help OMVG to carry on planning for the optimum use of the water resources of the Gambia River Basin.

C. Basis for the Report

The report is based on the author's considerable experience with river basin planning in the United States and on information gathered during the author's visit to Dakar and Banjul from April 21 through May 8, 1986. During that visit, meetings were held with the High Commissioner and the Technical Director of OMVG, the four expatriate expert advisors to the OMVG River Basin Planning Office, and officials of the USAID River Basin Development Office in Dakar. Field observations included on-the-ground inspection of portions of the lower Gambia River Basin in the vicinity of Banjul, and a low elevation overflight of the Gambia River Valley up to the site of the proposed Kekreti Dam. A list of references used in the preparation of this report is contained in Appendix A.

D. River Basin Planning

1. Definition: As used in this report, river-basin planning encompasses all of the investigations and studies undertaken in preparation for the rational development and management of the water and related land resources of a river basin for the benefit of the people in the basin and surrounding region.

2. Early History of River Basin Planning in the United States: Early water resource development in the United States was carried out on a project-by-project basis. A major

exception was the lower Mississippi River, where efforts to develop a comprehensive development plan began shortly after the middle of the 19th century. In the early years of the 20th century, as a part of the conservation movement, the idea of comprehensive planning for river basin development captured the imagination of many Americans. National leaders such as Theodore Roosevelt spoke of capturing and making use of every drop of water on its way from the watershed to the sea, a concept which, if carried to fruition, might have turned all of the Nation's rivers into a series of lakes behind dams.

This philosophy culminated with the production in the 1920's and 1930's of a series of comprehensive river basin plans by the U.S. Army Corps of Engineers. These reports, known as the "308 reports" because they were authorized by Congressional approval of a document with that number, set forth plans for developing the water resources of entire river basins for flood control, navigation, irrigation, and the development of hydroelectric power. The 308 report on the Tennessee River Basin became the basis for the system of dams which was developed by the Tennessee Valley Authority when it was created in 1933.

Many other river basin plans were developed and construction of projects undertaken along the lines of the 308 reports, but as our knowledge of hydrology progressed, it became evident that water resources development and management encompassed more than the construction of dams and other water control structures. The importance of watershed management became evident as early as 1936, when the Secretary of Agriculture was authorized to make studies of watershed management along with the authorization for flood control studies by the Corps of Engineers. In the Flood Control Act of 1944, eleven of these river basin watershed management programs were authorized, along with authorization of major structural flood control projects.

3. The Environmental Movement: The flowering of the environmental movement in the United States in the decade of the 1960's led to much greater public participation in planning for water resources development and management. While construction continued on many of the comprehensive river basin plans developed in earlier decades, proposals for new dams and water control works came under intensive scrutiny. Non-structural and non-revenue producing water management programs were given greater recognition, and the adverse impacts of water development projects on the environment began to be more clearly understood.

4. The Water Resources Planning Act: In 1965, the United States took a major step in river basin planning by enacting the Water Resources Planning Act. This Act created the U.S. Water Resources Council and gave it the responsibility for developing principles, standards, and procedures for the formulation, evaluation, and review of plans for the use and development of water and related land resources. The Act also authorized the President and the States to create river basin commissions to prepare comprehensive plans for the various river basins of the United States. Seven river basin commissions were created under this authorization.

The Water Resources Council gave a great deal of thought to the problem of developing the principles, standards, and procedures and performed a great deal of research on the subject before issuing them in 1973. After a great deal of study by federal agency staff members and at academic institutions, the Water Resources Council developed a system of multi-objective planning in which four objectives were to be considered :

- o national economic development;
- o environmental quality;
- o regional economic development; and
- o social well-being.

When finally promulgated in 1973, the principles and standards required optimization of only the first two objectives, but beneficial and adverse effects of projects were to be accounted for in all four categories, for the information of decision-makers.

5. Recent Nature of River Basin Planning Efforts in the United States: River basin planning in the United States became a major objective following the recommendation of the Senate Select Committee on National Water Resources in 1961. The Committee recommended that the federal government, in cooperation with the states, prepare and keep up-to-date plans for comprehensive water development and management for all major river basins in the United States. The program under this recommendation began in earnest in 1963 under the direction of the four federal departments whose Secretaries eventually made up the Water Resources Council, and was continued by the Council after it was established in 1965. The guidelines for planning called for "...consideration to be given to (a) the timely development and management of these

resources as essential aids to the economic development and growth of each region; (b) the preservation of resources, in appropriate instances, to insure that they will be available for their best use as needed; and (c) the well-being of all of the people as the overriding determinant in such planning."

About 10 framework plans covering large river basins and 15 more detailed plans covering smaller basins were prepared under this program.* A number of basic steps were taken at the beginning of each river basin planning exercise. These steps included:

- o projections of future population growth and economic development in the basin;
- o translation of such projections into demands for water and related land resource uses;
- o compilation of hydrologic data on quantity and quality of water available;
- o projections of related land use availability so as to outline the characteristics of possible water and land resource problems; and
- o outlining of general approaches that appear appropriate for solution of the problems.

After these preliminary steps had been taken and reviewed by higher authorities work proceeded with the identification of and planning for development of specific projects.

(*It is not intended to suggest that this marked the beginning of river basin planning in the United States. Earlier planning efforts included The "308 reports" prepared by the Corps of Engineers in the 1920's and 1930's, the Missouri, Colorado, and Columbia river basin plans prepared by the Bureau of Reclamation in the 1940's, the New England-New York and Arkansas-White-Red Basins plans carried out by inter-agency committees chaired by the Corps of Engineers in the 1950's, the Southeast Basins and Texas Basin plans prepared by independent commissions created by statute, and innumerable other basin plans for smaller basins, such as the Potomac.)

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In addition to outlining plans for dams and other water control works, the plans included inventories of all of the basins' water and related land resources and included programs for watershed management, outdoor recreation, preservation and propagation of fish and wildlife resources, and discussion of other amenities related to water management. The basin plans were not used as a basis for authorization of projects, but served primarily as an inventory of potential opportunities for making use of the water and related land resources of the basins. Detailed program plans were then prepared by the individual federal and state agencies seeking authorization for potential projects and programs. These plans were also prepared in the multi-objective format, but very few projects proposing construction of dams have been authorized since the early 1970's when the first of the basin plans prepared by the river basin commissions was completed.

A typical river basin planning effort during this era of U.S. river basin planning would be carried out by a staff of 20 to 40 persons in the basin commission office. In addition to the planning director and the administrative and support staff, there would be supervisory engineers, economists, programmers, and report writers, directing the activities of the professional and sub-professional staff carrying on the day-to-day analyses. Actual field work of making dam and reservoir surveys, compiling hydrologic data, land classification, laboratory analyses, etc. would be performed by the staffs of the federal and state agencies that were cooperating in the planning efforts.

Although no two river basin planning efforts in the United States have followed the same identical path, a typical planning process might include the following procedures, some of which would be carried on simultaneously.

1. Review of and accommodation to statutory authorities for planning.
2. Public hearings and other meetings with state and local officials, and with potential beneficiaries of and others affected by potential developments, referred to hereinafter as the interested public.
3. Review of available hydrologic, economic, sociologic and other data to determine adequacy or inadequacy.

4. Reconnaissance of basin to identify development potentialities.
5. Fill in gaps in data identified in step 3.
6. Develop simulation models of basin development potentialities.
7. Presentation of reconnaissance findings and development potentialities to interested public.
8. Assuming favorable reactions to reconnaissance findings, proceed with investigations of potential projects, including dam site seismology, dam site and reservoir topography, mapping of irrigable lands, flood plains and floodways, soil surveys and land classification, power market studies, interrelationships with other resources, etc.
9. Evaluate possible development scenarios.
10. Presentation of proposed plans, including details of potential projects and developments to interested public.
11. Make changes in development plan as appropriate in the light of comments received during the previous step and formulate recommendations.
12. Presentation of recommendations to the interested public.
13. Forward plan to higher authority with comments received and recommendations for further action. Depending on the nature of the planning effort, this may take the form of recommending approval of a comprehensive basin plan or recommendations for authorization of specific projects. If the latter, preparation of an environmental impact statement will be required. Collection of data required for actual preparation of the environmental impact statement required under the U.S. National Environmental Policy Act proceeds throughout and is an essential part of the process.

Many of these steps have already begun on the Gambia River Basin, and many are peculiar to the particular requirements of U.S. laws and regulations and may safely be omitted. Of the utmost importance, in the author's opinion, is the development of contacts with the interested publics or their representatives in the Member States, as defined in Steps 2, 7, 10, and 12 above.

6. Public Participation and Changing Concepts in Water Management: A major characteristic of water resources planning in the United States as it has evolved in the last half century is the increased public input to, or public participation in, the preparation of plans. Through public participation a wider range of objectives is brought into consideration and more definitive evaluations of beneficial and adverse effects of projects and programs can be made. Computer-based simulation modelling and the use of a systems approach permits analyses of a larger number of alternative plans, and helps in the resolution of conflicts between projects and purposes. As one result, there has been a trend away from the authorization and construction of large dams and toward more efficient water management and non-structural alternatives that meet the needs of the people of the basin in a less costly way. This has been accompanied by some major changes in the way the people of the United States and their water management agencies look at water resources. The following paragraphs describe several examples of how increased public participation in the planning process has contributed to improved planning and more acceptable plans.

a) The Potomac River Basin Example: One example of these changing concepts has occurred in the Potomac River Basin, site of the Nation's capital. Once known as "the Nation's most undeveloped river", the U.S. Army Corps of Engineers developed a plan to harness the river for flood control, hydroelectric power, pollution abatement by dilution of low flows, and water supply for municipal and industrial purposes. All this was to be accomplished through the construction of 14 major main stem and tributary dams and reservoirs, supplemented by watershed management programs which included over 400 small dams to protect the watershed and prevent the reservoirs from filling with sediment. Substantial benefits for recreation and fish and wildlife were claimed.

When the report was circulated for a review among the states of the basin and other federal agencies which had not participated in the preparation of the plan a number of new facets were developed, along with substantial opposition to the proposed dams on grounds of displacement of the basin residents and other ecological damages. Further studies of the ecological values and other amenities of the basin were conducted and a series of public hearings were held throughout the basin.

In the meantime, the staff of the Interstate Commission on the Potomac River Basin, an organization created by an interstate compact, undertook a systems analysis of the problem of supplying the city of Washington and its rapidly growing suburban environs with water for its expanding population which

is expected to double over the next 50 years. Using the information developed during the preparation of the report, the new analysis showed that by building one small reservoir on a tributary just upstream from Washington, by revising the operating regulations of a dam that was already under construction near the headwaters of the Potomac river, and by constructing interconnections between the water systems of the Maryland and Virginia suburbs and the central city, the water supply needs of the entire metropolitan area for the next 50 years could be met, with a saving of several billions of dollars and avoiding the dislocation that would have been caused by construction of the dams. (Sheer, 1983)

b) Orme Dam Controversy on the Central Arizona Project: The Central Arizona project was planned by the Bureau of Reclamation to pump water from the Colorado River and convey it several hundred miles to central Arizona. The project was planned many decades ago, before the advent of multi-objective planning, to provide additional water for irrigation and for municipal and industrial purposes in the metropolitan areas of Phoenix and Tucson to supplement the state's dwindling groundwater resources. A major feature of the plan as conceived by the Bureau of Reclamation was the Orme Dam on the Salt River just below the confluence of the Salt and Verde rivers. While the Orme dam would provide hold-over storage for irrigation and flood control for the city of Phoenix, it had the disadvantage of requiring the relocation of virtually the entire population of the Yavapai Indian Tribe, which occupied portions of the Fort McDowell Indian Reservation, established by Treaty along the Verde River. Other disadvantages included inundation of wildlife habitat that includes the nesting locations of the endangered bald eagle species, and replacement of a popular white water boating stream with a fluctuating lake.

Publication of the environmental impact statement for the Orme dam generated strong public opposition. Although the need for the dam was recognized, affected citizens demanded reconsideration, and the Bureau of Reclamation agreed to undertake a multi-objective planning process that included environmental and social concerns, as well as the need for flood control and water storage capacity. The planning process was conducted openly, with opportunity provided at every step for public participation and review. Thousands of people were involved and numerous public presentations were made by officials of the Bureau of Reclamation. While the process was time-consuming and costly, it led to the expansion of the project objectives to include water quality, environmental protection, wildlife preservation, recreation, social considerations, cultural resources, preservation of existing water rights, and improving the safety of existing dams. When

all of these objectives were taken into consideration and their values weighed against the values of the people affected, a new plan was evolved which called for enlarging the Waddell dam on the Agua Fria river west of Phoenix for hold-over storage, constructing a new dam on the Verde river, and enlarging and rebuilding two dams on the Salt River. The new plan garnered strong support from both proponents and opponents of the Orme dam, and while the cost of the new plan was higher than the cost of Orme dam, the benefits were also much greater, giving the highest benefit cost ratio of any of the eight alternative plans that was considered. (Brown, 1984)

c) Red River of the North: A similar re-evaluation and multi-objective planning process is now underway in the Red River basin. The Red River of the North rises in South Dakota and flows north into Canada, forming the border between North Dakota and Minnesota. The plan developed by the Souris-Red-Rainy River Basin Commission did not satisfy the residents of the Red River valley as it appeared to have been handed down to them from above, rather than springing from the needs and desires of the people themselves. Acting on their own initiative, the people of the basin organized what they term a "bottom-up" planning process, and through annual "International Summit Conferences" which involve the people of all three states and the Canadian portion of the basin they are evolving a plan. Through widening the public involvement it is hoped that road-blocks which have prevented the accomplishment of any part of the previous plans can be overcome. (Olsenius, 1985)

7. Changes Under the Reagan Administration: One of the first actions taken in 1981, when James Watt took office as Secretary of the Interior and as Chairman of the Water Resources Council under President Reagan, was the de-emphasis of river basin planning by abolishing the river basin commissions. Principles and standards for multi-objective planning were replaced by principles and guidelines which place primary emphasis on economic efficiency. Cost sharing by beneficiaries has been given greater importance and a system of planning is evolving which places greater reliance on techniques for resolving ever-present conflicts which pit beneficiaries of water project development against those suffering losses.

The comprehensive river basin planning on the rational-evaluation model referred to by Shabman (1984) that produced basin development on the TVA model, has been replaced by a system of adaptive planning. Under this system, water management decisions are made as incremental adjustments from the status quo because we will never have enough information to

draw up and implement the "perfect" large scale basin plan. With the current shortage of investment capital, the adaptive planning philosophy encourages the construction of smaller projects that can be financed in large measure by the beneficiaries through the sale of revenue bonds that can be repaid from revenues from the projects.

PART II - THE USAID-OMVG PROJECT

A. Mission and Organization of OMVG

After a decade or more of preliminary discussion and agreements between the governments of Senegal and The Gambia, a Convention on the Status of the Gambia River was signed by the presidents of the two countries on June 30, 1978, and subsequently ratified by the legislative bodies of the two countries. At the same time a Convention for the Creation of the Gambia River Basin Organization to implement the former agreement was agreed to. The organization thus created, with the French name of Organisation pour la Mise en Valeur du Fleuve Gambia (OMVG) was charged with carrying out the purposes of the Convention on the Status of the Gambia River which is to facilitate the rational development of the Gambia River. In carrying out this mission, OMVG is to promote and coordinate the studies and works for the development of the basin within the national territories of the member states and to execute such technical and economic projects as Member States wish to assign to it.

A number of further treaties and protocols have further defined the duties, responsibilities, and operating procedures of OMVG. Four permanent bodies are provided for:

1. The Conference of Heads of States and Governments
2. The Council of Ministers
3. The High Commission
4. The Permanent Water Commission (sometimes referred to as the Permanent Water Committee)

The High Commission is the staff of OMVG and it operates under direction of the Council of Ministers which consists of a minister from each Member State who is supported by representatives of the other ministries of his government.

The Permanent Water Commission as originally contemplated was to be responsible for defining the principles and methods for apportioning the use of Gambia River waters among the Member States and among the industrial, agricultural, and transportation sectors of the economy. The Commission was to be composed of representatives of the Member States serving as an advisory group to the Council of Ministers.

A number of changes have been made since the original conventions on the Gambia were ratified. In 1981 Guinea was admitted to membership in OMVG and in 1983, Guinea-Bissau was added. By regulations approved on May 29, 1981, a Consultative Committee with representatives of the Member States and OMVG was created to assist the High Commissioner in mobilizing

financial resources to implement OMVG's programs, and the title of the Permanent Water Commission was apparently changed to be the Permanent Water Committee, hereinafter referred to as the PWC. As set forth in the agreement of May 29, 1981, the PWC is to consist of two representatives from each Member State and is to meet once a year at the call of the High Commissioner, who is to prepare the agenda for the meetings.

In addition to giving opinions and making recommendations to the Council of Ministers on apportionment of the waters of the basin, the PWC is responsible for examining requests for use of water and execution of projects that may modify the characteristics of the river, considering such matters as navigation conditions, agriculture, industry, sanitation, water levels, and the biological characteristics of fauna and flora. In particular, the PWC is to take quantitative control over the waters of the Gambia River before and after regulation of its flow.

The High Commission, under the direction of a High Commissioner appointed by the Conference of Heads of States and Governments, is responsible for directing the work of the High Commission in carrying out the day-to-day operation of OMVG. At the present time, the staff comprises about 30 members recruited from the Member States, plus an expatriate advisor, provided by the United Nations Development Program (UNDP), to the High Commission, and four expatriate technical experts provided by USAID to assist in developing the planning capability of the organization. USAID has also provided funds for training three local counterpart experts who, together with a fourth counterpart expert who is already on the job, will work with the expatriate experts and will staff the OMVG planning unit following the completion of the USAID project. Additional funds have been provided by UNDP and other donors to assist the OMVG in carrying out other tasks.

The OMVG staff is financed by contributions assessed against the four Member States. At the time the USAID project was initiated in May of 1981, OMVG indicated that funds for construction of a downstream salinity barrier in the tidal portion of the Gambia River had already been pledged by the EEC, the Federal Republic of Germany, the Islamic Development Bank, and the African Development Fund. (USAID, 1981). Funds for a feasibility study of the Kekreti dam in Senegal Orientale province were also to be provided by the Federal Republic of Germany. It is understood that the final report on this study is nearing completion (Semi-Annual Activity Report, OMVG, January 1986, p. 101) but funds for the salinity barrier have not been made available. The High Commission is continuing efforts to raise funds for implementing the projects proposed

in an action plan prepared with the support of UNDP in 1982, but the present state of world capital markets does not lend much hope for the success of these efforts.

B. Role of USAID

1. The 1981 Project: USAID's Gambia River Development Project stems from a request made on July 15, 1980 by the High Commissioner of OMVG for assistance in mapping, environmental studies, socio-economic studies, institution building, and provision of logistic support for documentation and data processing. In the area of institution building, the High Commissioner recognized the absence or inadequacy of his staff in certain areas and asked for expatriate technical assistance in the fields of the environment, river basin planning, macro-economics and finance, and socio-economics, coupled with assistance in the attachment and training of national counterparts in these fields (USAID 1981, Annex C).

In authorizing the project on May 27, 1981, the USAID Administrator, as conditions precedent to making any commitments under the project, required OMVG to show that the terms of reference for the aforesaid national counterparts to the four American technical specialists had been approved by OMVG's member states, and that provisions had been made for financing the employment costs of the counterparts.

OMVG was also required to covenant:

- o To hire and maintain an administrative and technical staff adequate in numbers and quality to effectively carry out the project;
- o To prepare and update annually a full OMVG budget covering the period up to September 30, 1988 showing all costs and the source of funds for financing them;
- o To prepare an action plan that addresses agricultural pricing policy considerations within the Gambia River Basin;
- o To utilize Member State technicians and resources to the maximum extent possible in order to encourage effective communication between Member States and to insure that Member State development priorities and strategies are reflected in OMVG's planning and coordinating process; and
- o To provide evidence satisfactory to USAID that the counterparts to the four long-term technical assistants

to be provided under the project have been nominated and approved by August 1, 1981 and hired by December 31, 1981.

Major activities under the USAID project included aerial surveys and topographic mapping of the basin on a scale of 1:25,000 and an analysis of the socio-economic and environmental effects of the water resource development projects that had been proposed for the Gambia River Basin. The analysis was conducted by the Center for Research on Economic Development at the University of Michigan and is referred to herein as the University of Michigan studies. The five volume report on these studies was published in 1985.

In a mid-term review of progress under this project conducted by USAID in 1984, the review panel expressed satisfaction with the technical progress under the project, but expressed concern over the ability of the OMVG planning operation to sustain an adequate planning process to support competent decisions on development actions over the next few years. To rectify this condition, the panel recommended strengthening the planning unit by providing an experienced river basin planner, by providing for advanced training of OMVG staff members, and by establishing a documentation center, an environmental monitoring laboratory, computer capability, and map storage facilities.

2. The 1984 Amendment: In furtherance of these recommendations, the USAID project was amended on December 5, 1984 to extend the project completion date to December 31, 1987, and to provide additional funds. In amending the contract, additional emphasis was placed on strengthening the institutional capability of OMVG to carry on the planning process after the end of the project.

The project amendment added new conditions precedent to disbursement of funds provided under the amendment. OMVG was required:

To provide evidence that conclusions and data from the socio-economic and environmental studies being prepared by the University of Michigan would be fully incorporated into the OMVG Action Plan;

- o To agree as to the placement and responsibilities of the USAID-financed river basin planner within the OMVG organizational structure; and
- o To resolve the problem of securing an acceptable office building for the USAID-funded personnel and activities.

New covenants were added requiring OMVG:

- o To assure USAID that the Water Resources Laboratory to be provided would be supported and funded for at least five years after termination of the USAID project;
- o To undertake an integrative planning exercise for application to major water resource development decisions within one year after the submission of the University of Michigan socio-economic and environmental final reports; and
- o To make available before June 1985 and for a duration of at least three years, the services of a documentation/information resource specialist to work as a counterpart to the USAID-financed data management specialist to be assigned to OMVG.

Because of lack of funds, the OMVG has found it difficult to comply with all of the conditions precedent and covenants contained in the authorization for the 1981 USAID project and the 1984 extension.

The University of Michigan studies raised a number of questions as to the economic value and environmental effects of the proposed projects which cloud the original mission of OMVG to coordinate the construction of the dams. These questions will need to be resolved before attempting to proceed with construction under the original plan. To assist the OMVG in this effort, USAID is providing assistance in the form of financial support for a team of technical experts who are developing a planning process to resolve the questions.

3. The OMVG Planning Unit: The USAID-financed planning team became operational in the summer and fall of 1985. It consists of a supervisory river basin planner, Pierre Jutras; an economist, James Webb; an hydrologist, John Risley; and an environmentalist, Andre deGeorge. A sociologist retained under the earlier project completed his service in the fall of 1985. Only one of the four counterparts is on the job at the time this report is prepared (June 1986), an hydrologist, Babucar Bah, from Guinea. He is considered by OMVG to be the counterpart to the river basin planner although the USAID project considers the OMVG technical director to be in this role. The OMVG Council of Ministers requested the Republic of Guinea-Bissau to nominate a candidate to fill the position of Director of Planning in the recently reorganized High Commission. Presumably the occupant of this position will become the counterpart river basin planner. Until the position of Planning Director is filled, the Technical Director of the

High Commission is administratively responsible for the planning unit. The remaining three counterparts are completing their training in the United States and all three will not be on the job until the end of 1986.

4. Consultative Services: USAID has supplemented the work of the planning unit with short-term consultants, including a resource-economist, Charles Howe of the University of Colorado; two hydrologists, Hubert Morel-Seytoux, of Colorado State University, and Douglas Spears, of the U.S. Army Corps of Engineers; and the author of this report, a water resources planning and policy specialist. Other consultancies are contemplated.

PART III - THE OMVG PLANNING PROCESS

A. Proposed Work Program

In the absence of the counterpart experts, who are currently being trained, the four USAID-financed expatriate experts working with the counterpart hydrologist evolved a work program to cover activities from November 1985 through September 1986. The work program consisted of 1) a proposed "global work plan" dealing, among other things, with the development of a planning methodology for integrating the conclusions and data from the University of Michigan socio-economic and environmental studies into the OMVG plans, 2) a proposed month-by-month schedule of activities for each member of the planning team for the 11 month period, and 3) a list of short term consultant services proposed to supplement and strengthen the work of the planning team.

The work program was discussed with OMVG officials at a meeting held on December 10, 1985. The minutes of this meeting (OMVG, 1986, pp. 29-39) indicate that OMVG recommends that the generalized work plan be eliminated from the plan and that the balance of the schedule of activities, including the proposed consultants, be retained subject to submission of terms of reference for each activity to the High Commission prior to its execution. Elimination of the proposed "global work plan" suggests that OMVG is unwilling to integrate the findings of the University of Michigan study into The Gambia River Basin Development plan. In discussion of the OMVG stance on this question, the Technical Director of OMVG advised the author that the High Commissioner had advised USAID that it did not believe it was obligated to implement the findings of the University of Michigan because its covenant to do so had been given before OMVG had any idea of what the study would recommend.

B. Constraints to Implementation of the Work Program

This situation illustrates the major problem which has made the work of the Planning Unit very difficult. The OMVG is committed to building a series of dams, including the Balingho salt water intrusion barrier, the Kekreti upstream storage reservoir, and smaller dams on tributaries in Guinea. In fact, the treaties and covenants under which OMVG operates appear to be based on the premise that its primary function is to coordinate the implementation of projects selected by the Member States. Thus, to OMVG, integrated basin planning may appear to be an extraneous activity.

The work of the Planning Unit is also constrained by other problems, such as delay in the training of counterpart experts, poor communications and transportation facilities, and language barriers. Extra effort required to overcome all of these constraints prevents the planning unit from being as fully effective as a similar organization performing the same functions in the United States or another well-developed country. In spite of all of these constraints, it will be necessary to come to terms with the questions raised by the University of Michigan studies. Some significant work has been accomplished, particularly in the development of an hydrological model for analyzing alternative scenarios for basin development. With continued diligent efforts on the part of the Planning Unit and with the cooperation of all segments of OMVG it will be possible to overcome the constraints and implement a planning process that will provide a basis for managing the water resources of the Gambia River Basin.

C. Development of a Work Plan

The present hiatus resulting from the drying up of construction funds provides time that can profitably be used for development of a work plan for the OMVG planning unit that will foster development of a systematic planning methodology and lead to a development plan that will promote sound water management in the basin. The end objective should be the production of a document that is, indeed, a plan to form the basis for decision-making. The plan should display alternative courses of action and should contain recommendations on the desired course of action in terms of explicit structural or non-structural measures, with appropriate detail.

1. Criteria for Planning: A study of water resources planning made by a panel of experts for the U.S. National Water Commission (1972) set forth the following criteria for a "good" plan. The panel suggested that a water resources plan should:

- o include an accurate, succinct statement of the goals and objectives which the plan is expected to achieve, and a delineation of how the plan meets these goals and objectives;
- o cover a rational planning area. For the Gambia, this may indicate the desirability of an overall plan for the basin, with sub-plans for hydrological subdivisions or sections of the basin within each Member State;
- o have adequate detail to fit the type of action proposed;

- o fit into a multi-sectorial plan for the region, i.e., be coordinated with plans for all sectors of public and private endeavor, such as land-use, housing, transportation, waste disposal, and energy supply;
- o illuminate all of the alternatives that were considered, including the advantages and disadvantages of each and the basis for selection of the recommended plan;
- o provide for an equitable allocation of the resources, based on reliable information on direct and indirect costs, economic benefits, and intangible consequences; and
- o have a proper balance to meet uncertainties by maintaining flexibility, so that adjustments to future conditions can be readily made. The plan should have a proper balance between earlier action to meet short-term needs, while retaining as many options for the long-term future as possible. Irrevocable allocations of water resources should be avoided when a more flexible alternative is feasible.

In addition, there will have to be a mechanism for dealing with and resolving the inevitable conflicts that arise in planning for water resources management.

It must be recognized that the planning team, consisting of a planning director assisted by four expatriates and four counterpart experts from the Member States, will not be able to do all of the planning themselves. They will need to enlist the efforts of the ministries and agencies of the Member States in formulating statements of objectives and enlisting participation of the people of the basin, the ultimate beneficiaries of the project. Only in this way can a planning institution evolve which will survive after the USAID project is ended. Because of the complexity of the issues, consultants will be needed from time to time to augment the technical skills of the resident experts and the staff of the Member State agencies.

2. Planning Methodology: The methodology of the water resources planning and management process should include the following steps if it is to be responsive to the needs of the people.

- a) Formulation of overall objectives, goals, and policies for water resources management.

- b) Analysis of the water and related land resource base for comparison with projected needs and opportunities for water use.
- c) Development of a number of possible alternative plans, both structural and non-structural, for meeting needs, and solving problems.
- d) Analysis of the economic, social, and environmental impacts of the alternative plans.
- e) Display of alternative plans and their impacts to the interested public to obtain feedback.
- f) Decision on the alternatives to be selected and preparation of a report or reports to implementing authorities.
- g) Implementation of the decision, or if it has not been possible to reach a decision on a viable alternative, reiteration of the planning process to arrive at a different plan.
- h) Operation of the project or system but continuing planning to keep the overall water management system plan up-to-date.

Figure 1, taken from the report of the Water Resources Planning and Management Division of the American Society of Civil Engineers on Social and Environmental Objectives in Water Resources Planning and Management shows the interrelationships and feedback loops of these steps. As indicated on the diagram, dissemination of information to the public, and participation and feedback into the planning process is a very important part of the planning process.

3. Adaptation to the Gambia River Basin: Recognizing the difficulties of communication with the ultimate beneficiaries of the projects in the Gambia River Basin, the ministries and agencies of the Member States will have to be used as surrogates for the interested public. It appears that the treaties and conventions under which OMVG was created contemplated that the Permanent Water Commission would be the appropriate body to provide advice to the Council of Ministers on matters and questions arising during the planning. Although the Permanent Water Commission consists of only two representatives from each Member State, representatives of all of the ministries and agencies having responsibilities with respect to the water and related land resources of the Gambia River Basin in each Member State will have to be consulted in the planning process.

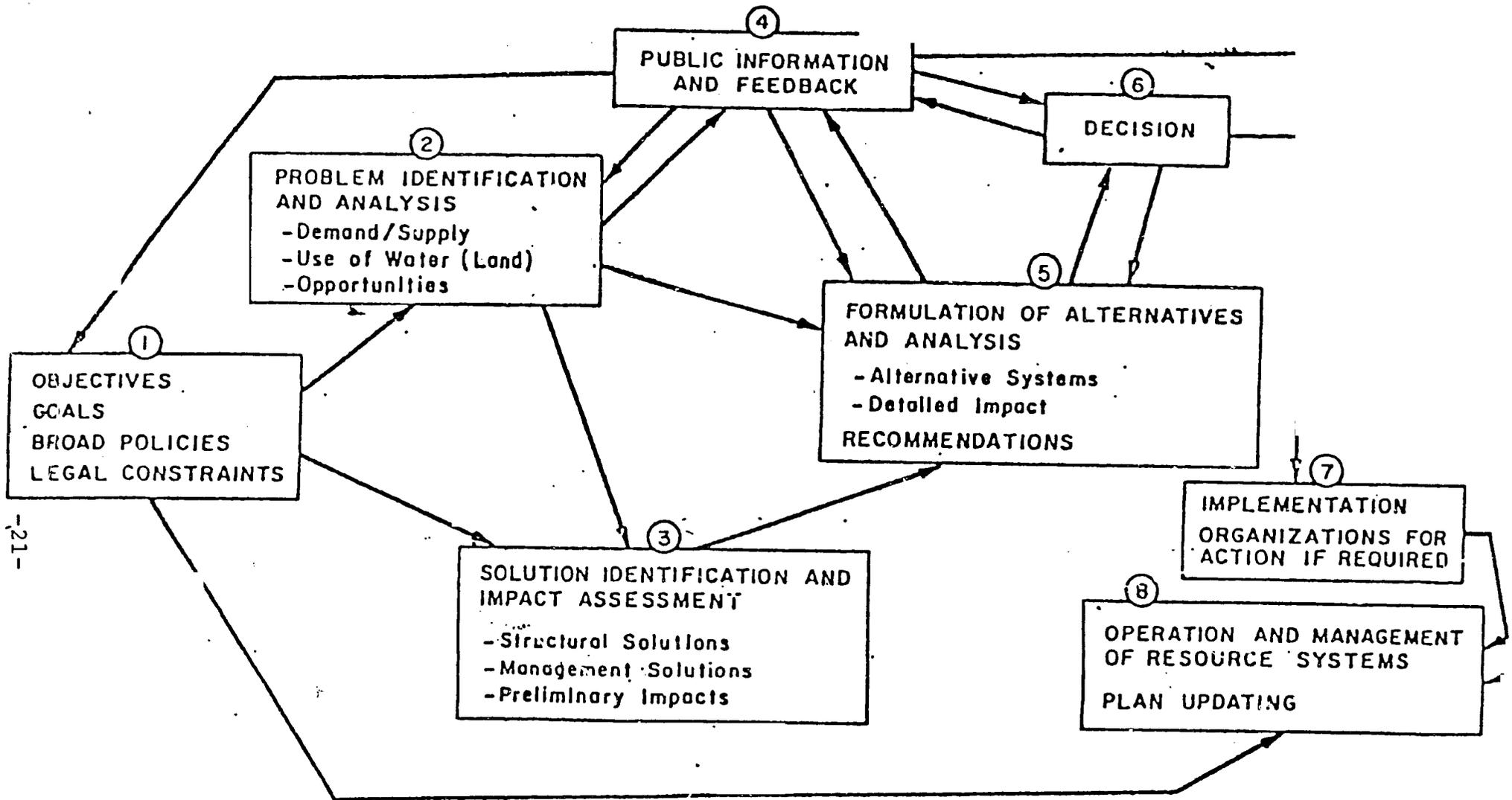


FIGURE 1 - THE PLANNING AND MANAGEMENT PROCESS
WATER AND RELATED LAND RESOURCES

Figure 1

The amount of time required for effectuation of the planning process will depend on the resources made available by the Member States and the quality of the information and data already accumulated. In any event, based on experience in planning for developments of the magnitude of those contemplated for the Gambia, the planning process will extend over several decades, extending well beyond the construction of the first works of infrastructure. Thus it is very important to establish a firm foundation for the planning effort. In the eighteen months remaining in the USAID project, it should be possible to make a good start on a work plan which places high priorities on data collection and analysis, development of an information network that will assist in coordinating the efforts of all interests in the basin, and formulation of goals and objectives for resource management in the basin.

4. Data Collection: One of the most important tasks that must be performed prior to making any decision leading to the construction of any infrastructure is the obtaining of climatological, ecological, hydrological, and socio-economic data which will permit assessment of the effects of proposed projects and programs. The staff appears to be well equipped with computer capability to handle this data once it is obtained. The amount and quality of data presently available needs to be augmented. Only climatological data goes back about 40 years, and stream flow records less than 20. Socio-economic and environmental data appears to be limited to that collected during the conduct of the University of Michigan studies, but there may be data in the offices of the ministries and agencies of the Member States that has not come to the attention of the author.

a) Hydrology: One area in which satisfactory progress is being made is hydrology. Although the records of stream flow in the Gambia River are short, and leave much to be desired, there appears to be enough data to permit the development and calibration of the streamflow synthesis and Reservoir Regulation (SSARR) model for the Gambia River Basin. The resident hydrologist, with the assistance of consultants Hubert Morel-Seytoux and Douglas Spears appears to be well on the way to developing the model. Efforts should be made to correlate operation of the model with available climatological data, since some of the climatological records go back longer than the meager river stage measurements. Some caution is warranted because of the apparent trend toward reduced precipitation and stream flow in the Sahel, which may adversely affect project operation in the future if it continues. Further efforts are needed to incorporate ground water into the SSARR model or develop a ground water flow model. It is very

important to obtain data on ground water levels and ground water quality on a continuing basis, as projects based on conjunctive use of ground and surface water need to be considered as alternatives to projects using surface water alone.

b) Environmental Data: To provide data for assessing environmental impacts of proposed projects the work plan contemplates establishment of a water resources laboratory on a houseboat to be deployed at various points in the Gambia River estuary, with a satellite laboratory in Labé, Guinea. The plans appear to be well thought out, with the intention of using the member state personnel who were trained to assist in the preparation of data for the University of Michigan studies. The plan for the laboratories should be effectuated as soon as possible, so as to sustain the momentum of the Michigan studies and develop an ecological base line from which to assess potential effects of projects.

c) Watershed Management: Going beyond the intended scope of the water resources development program suggested in the Indicative Plan (OMVG 1986) is the need for watershed management and sediment control programs on the watershed above the potential dams. As noted hereinbefore, water-flow retention and soil-erosion prevention have been part of the U.S. flood control program from its beginnings in 1936. It is essential that data be obtained that will permit development of plans to protect the watershed of the Gambia River to proceed apace.

d) Socio-economic Data: The lack of socio-economic data for the Gambia River Basin is the weakest link in the planning process. Information and techniques developed in the United States for dealing with these aspects of water resources management are of little value in this part of Africa because of the vastly different socio-economic conditions of the populace. The University of Michigan accumulated an immense amount of data on individual villages and compounds which is available to the planning staff on computer discs, but it is not complete, and is not sufficiently quantitative to be useful in planning. The lack of accurate macro-economic data and models for the OMVG Member States also makes it difficult to conduct an integrated planning exercise in which proposed new projects can be analyzed as a part of the national economies of the Member States.

5. Use of Simulation Models: Simulation models are valuable tools that have been used in developed countries to enhance our ability to understand and manage water resources.

It must be recognized, however, that simulation models give results no better than the data that is put into them. This author has grave doubts as to the value of simulation modelling for the Gambia River basin at the present time, except in the field of hydrology. The use of hydrologic models has been developed over a long period of time, and ways have been developed to compensate for deficiencies in quantity and quality of data. While the author has not had personal experience with the SSARR model, it was developed to guide operation of a much larger and more complicated river basin in the United States, and has been the subject of favorable commentary in the technical press. It should be possible to adapt it to modelling the Gambia River basin and will permit analysis of the hydrologic effects of various alternative systems of development. The one missing link is the inability of the model to simulate ground water interrelationships. There are numerous ground water models and apparently there is a great deal of information available to support them. The Holcomb Research Institute at Butler University in Indianapolis has undertaken studies of various ground water models and it might be profitable to consult that organization to see if any of its work could be applied to problems in the Gambia River Basin.

Modelling of economic inputs and outputs for multi-objective analysis of potential developments in the Gambia River Basin should help in determining which projects should be undertaken and in what sequence. Based on the large number of gaps in data necessary to construct an economic model, as revealed in the University of Michigan's five-volume Gambia River Basin Studies report, the author does not believe there are sufficient data available at the present time to permit an adequate model to be constructed, much less verified. Data on the portion of the basin in Guinea, in particular, is lacking. Before any realistic model can be used it will be necessary to assemble a substantial amount of data on the economic activities of the portion of the basin in each Member State. Failure to do this before attempting to adopt a plan of development would be particularly risky in a basin such as the Gambia, where projects in one Member State may have adverse as well as beneficial effects in other Member States.

Ecological modelling techniques are still in their infancy, and great controversy still exists as to ex post facto effects of projects that have been in place for many years. The University of Michigan studies again reveal a lack of sufficient data to adequately model the ecology of the Gambia. A number of years of data collection and analysis as contemplated in the water resources laboratory portion of the Planning Unit's work plan will be required before an ecological model can be constructed and verified.

PART IV - RECOMMENDED WORK PLAN

A. Implementation of the Work Plan

Implementation of a work plan to achieve the objectives of the USAID project will require the accomplishment of a number of tasks, several of which will have to be carried on simultaneously and continuously throughout the planning process and some of which are already underway. Accomplishment of these tasks must be accomplished with the full participation of the entire OMVG staff so that it will be in a position to carry the planning task after the completion of the USAID project. This listing of tasks is predicated on the assumption that the topographic mapping of the basin is adequate and that the plans for environmental laboratories in The Gambia and at Labé in Guinea, and for the use of the SSARR model will be carried out along the lines contemplated. Figure 2 is a schematic diagram of the process, showing feedback loops. Time sequence of the remaining 18 months of the USAID project is shown on Figure 3.

Task 1. Establish contacts and maintain liaison with Member State ministries and agencies and other entities and individuals sharing objectives of advancing the development of the Gambia River Basin through management of its water and land resources. This will involve:

- a. Travel to headquarters and field offices to make personal contacts;
- b. Correspondence with individuals and non-governmental entities;
- c. Circulation of a newsletter or information bulletin to keep everyone up to date on progress and problems;
- d. Periodic meetings, possibly under the aegis of the Permanent Water Commission; and
- e. Training of Member State personnel to conduct data collection exercises and project analysis in the field.

Participants in other economic and rural development assistance programs such as those of various religious organizations, Peace Corps Volunteers, U.S. Soil Conservation Service (Harvey Metz), etc., should be included in this network so as to take advantage of what they are doing.

Task 2: Formulate statements of goals and objectives that can be achieved through resource management and seek approval of the Permanent Water Committee and the Council of Ministers. This should be done in consultation with the group identified in Task 1.

FIGURE 2

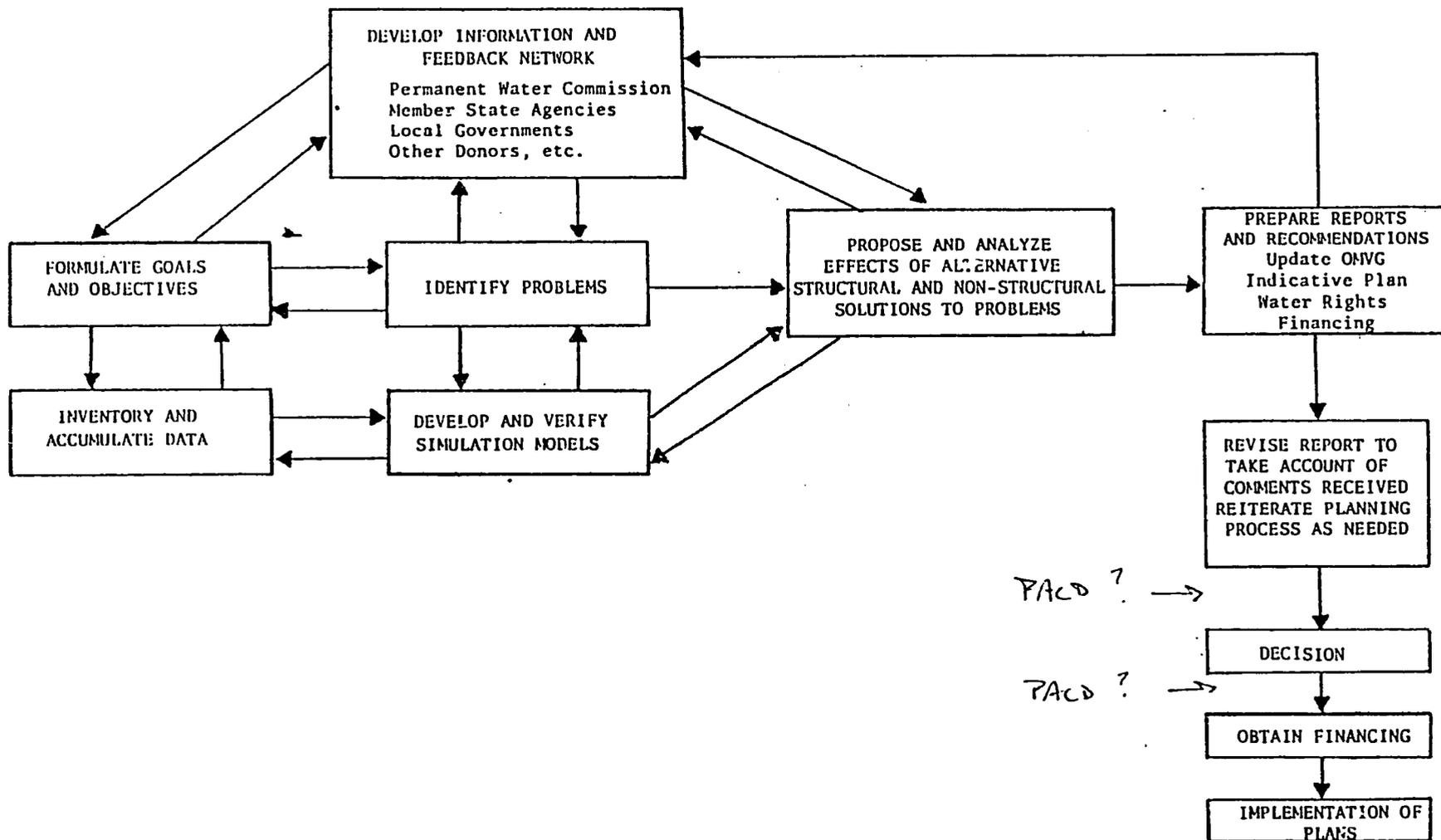
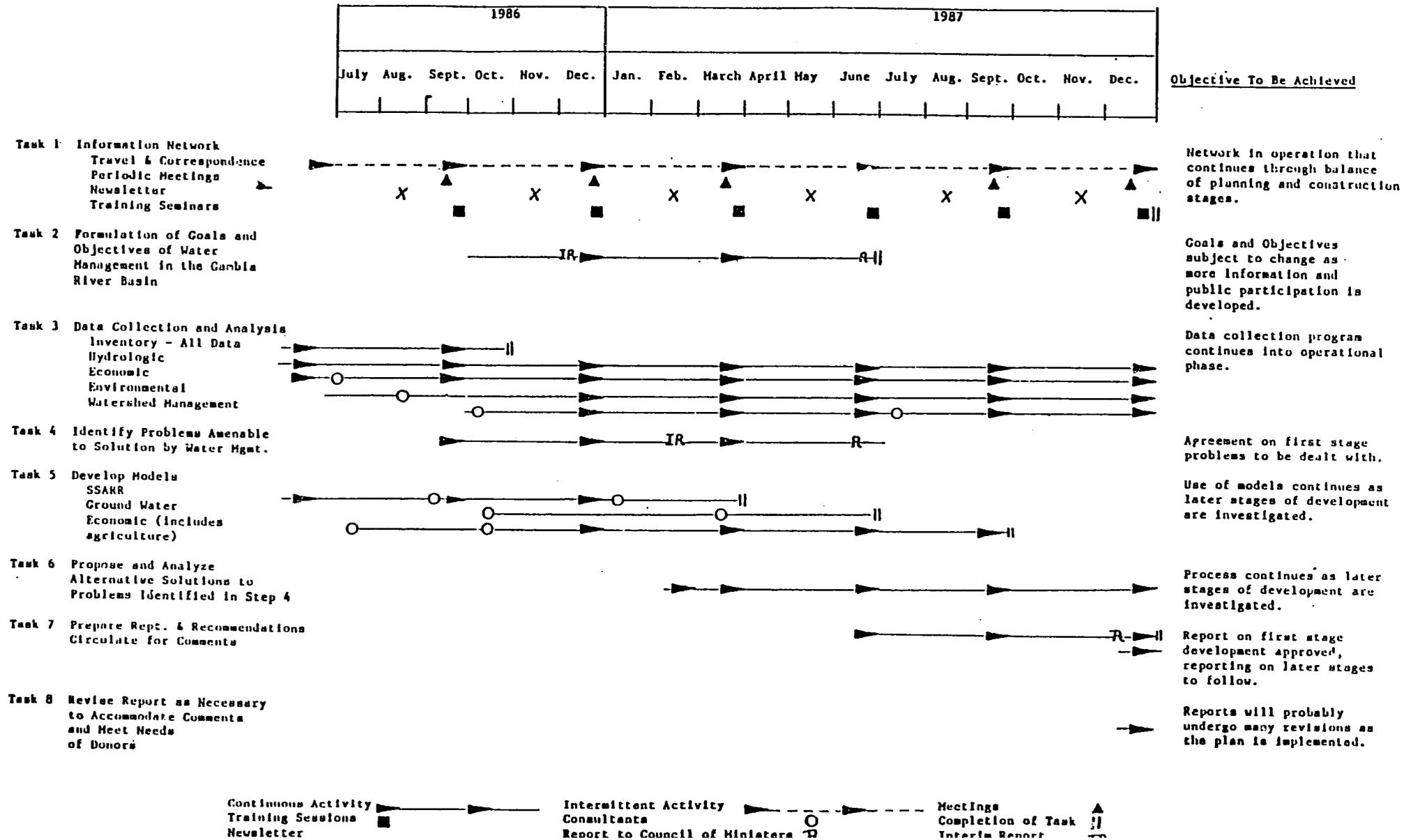


FIGURE 3

SUGGESTED IMPLEMENTATION SCHEDULE
 OHVG PLANNING UNIT
 July 1986 - December 1987



Task 3: Simultaneously with accomplishment of Tasks 1 and 2, inventory and analyze available climatological, economic, environmental and hydrological data (some, and perhaps all, of this has already been done) and design a program to fill in gaps and develop data adequate to develop hydrologic, economic, and environmental models of the basin. This includes the following:

a. hydrologic data

- 1) rainfall
- 2) run-off
- 3) evaporation
- 4) surface water quantity and quality
- 5) ground water quantity and quality
- 6) water rights

b. economic data

- 1) agricultural production, marketing, and costs for irrigated, rainfed, and recessionally farmed land, pasture, timber, etc.
- 2) energy production and use.
- 3) manufacturing, mining, and other industrial production.
- 4) fisheries, estuarine and riverine.
- 5) macro-economics of the Member States.
- 6) transportation.

c. environmental data

- 1) land use
- 2) deforestation
- 3) erosion and sedimentation
- 4) flora and fauna
- 5) productivity of estuarine portion of basin

d. demographic and other social data

- 1) population projections
- 2) local governmental structure
- 3) social structure of villages and compounds

The data collection program should be undertaken in cooperation with the ministries and agencies of the Member States, which will have to continue the program beyond the project completion date.

Expert assistance on data management may be required to develop a system for handling and making use of this data. Experience gained by monitoring progress on the OMVS program should be used to guide data collection programs.

Task 4: In cooperation with the Network established in Task 1, identify problems that exist in the basin and that can be addressed by resource management programs.

Task 5: Develop and verify models for use in analysis of proposed solutions to problems and their effects.

a. SSARR model for analysis of potential surface water developments and effects.

b. ground water model that can be operated in conjunction with SSARR model and that is capable of predicting safe yield and quality.

c. econometric model that will permit analysis of effects of proposed solutions on economies of the Member States. Effectiveness of such a model will depend on the extent and quality of the data that can be obtained.

d. benefit cost model for analysis and comparison of potential projects and programs.

e. after sufficient data series are built up efforts can be made to develop environmental models that will help in the analysis of effects of alternative developmental scenarios.

Task 6: Propound alternative structural and non-structural solutions to problems identified in Task 4 and analyze their effects using the models developed in Task 5, and taking advantage of experience gained by observing progress on OMVS development.

Task 7: Prepare report and recommendations and circulate for comments.

Task 8: Revise report to take account of comments as necessary, and submit for approval of recommendations and solicitation of financial assistance.

Since the success of the recommended program will depend on the availability of financing, potential donors should be kept informed during the planning process and should be given opportunity to participate in the public information and feedback network.

As the work progresses, efforts should be made to use information being developed under the Settlement and Resource Systems Analysis Cooperative Agreement (SARSA) between Clark Science and Technology Division of USAID, under which studies are being made of African projects that are completed or underway in the hope of drawing conclusions that will guide work on future water management problems, such as those of the Gambia.

B. Suggestions for Specific Studies

Along with the work plan, there are a number of specific studies that should be pursued to provide inputs to the work plan. The University of Michigan studies have raised questions that need to be resolved before proceeding with the construction of works of infrastructure in the Gambia River Basin. Re-analysis of some of the proposed works might lead to a better plan. A multi-objective planning process along the lines developed for river basin planning in the United States can be adapted to help in resolving the questions and analyzing proposed projects and programs.

1. Salinity Barrier: In addition to the further studies of water flow retardation, soil erosion prevention, and sedimentation suggested earlier, it would be desirable to review the whole concept of the Balingho dam as a salinity barrier. It is not clear why it is necessary to create a shallow lake of depth averaging 1.5 meters with a surface area ranging from 716 km² in the wet season to 294 km² in the dry season behind the salt water barrier. There are several salt water barriers in the United States which have navigation locks and a gated structure to pass fresh water downstream but with a sill to prevent salt water intrusion. Rather than flooding areas devoted to rice irrigation, as in the case of the Balingho Dam, these barriers, on the Calcasieu and Mermentau River Basins in Louisiana, serve to protect upstream rice irrigation. Since the original intent of providing irrigation water for a substantial acreage from Balingho appears to have been negated, it might be well to consider a structure that does not create a permanent impoundment.

2. Relationship to OMVS: The relatively advanced stage of development in the Senegal River Basin under the aegis of the OMVS affords an opportunity for OMVG to adapt the Gambia River Basin planning effort to take advantage of the lessons learned by OMVS. Likewise, experience in other African river basins should be studied and used to advantage. There are a large number of studies under way or contemplated. Results of these should be made available to the OMVG for use in the planning process in the hope of minimizing adverse effects of development. Time did not permit the author to explore everything that is being done in this direction, but it appears that enough work is under way that it would be wise to coordinate it through the establishment of a West African water resources research center along the lines of the water resources research centers established in the United States. One of the major functions of such a center would be the dissemination of information and technology transfer among the various USAID-financed projects in West Africa.

3. Cost Sharing and Reimbursement: It seems unrealistic to expect any donor to put up funds to construct major works such as those called for in the Indicative Plan of OMVG without any cost sharing or reimbursement by the beneficiaries. The University of Michigan reports raise questions as to the ability of beneficiaries to pay for the projects but are not definitive. Studies of the repayment ability of project beneficiaries should be an important part of the supporting material for the river basin plan.

4. Water Rights: Apparently there has been little consideration given to the problem of rights to the use of the waters of the Gambia River. The Permanent Water Commission has the responsibility of making recommendations to the Council of Ministers on the distribution of the waters among the Member States and the various users, but to the best of my knowledge, the Commission has not met. The time available for the preparation of this report did not provide for a study of the water rights systems in the Member States, but assuredly present users of the waters of the Gambia have some rights to the continued use of such waters. A thorough study of water rights in the Member States and how they can be accommodated to proposed plans needs to be made, if it has not already been made.

PART V - CONCLUSIONS

OMVG will have to resolve questions raised by the University of Michigan studies before proceeding to develop the water resources of the Gambia River Basin. A multi-objective planning process along the lines developed for river basin planning in the United States can be adapted to help. As potential beneficiaries of development are not organized and there is little evidence that the agencies of the Member States that will be responsible for incorporating the benefits of the projects into their national economies have been involved in the planning, a heavy burden will be placed on the staff of the Planning Unit to bring them into the planning process. The river basin planning should be conducted along the lines of the adaptive planning model as defined and discussed in Shabman's (1984) article, taking advantage of opportunities and developments as they occur, and using the staff and facilities of the Member States to the extent they can be made available.

The Member States of the OMVG may lack the financial resources to support OMVG in maintaining the momentum of the planning effort begun under the USAID project without financial assistance from external sources. The problems are not unique to the Gambia River Basin. If the United States has a continuing interest in the well-being of the people of western Africa, it should consider supporting research through a research institute or facility that can launch a coordinated attack on all of the water related problems of that region. One of the first efforts should be monitoring the progress toward assimilation of the output of the dams on the Senegal River into the economies of the Member States of OMVS, so as to take advantage of the experience gained to help in development of the resources of the Gambia River basin.

Care should be exercised in the use of simulation models to predict outcomes of various development scenarios for the Gambia River basin. Computer printouts have an appearance of great precision because of the way they present data, but we must always remember that the quality of the data that goes into the model determines the quality of the result. It is dangerous to place too great a reliance on models that are based on insufficient data.

PART VI - RECOMMENDATIONS

The following recommendations suggest actions that should be taken by OMVG, the OMVG Planning Unit, and USAID to improve management of the program for development of the Gambia River basin.

A. Recommendations for OMVG

1. OMVG should approve a work plan for the planning unit along the lines outlined herein (pp. 25-29);

2. OMVG should implement and schedule regular meetings of the Permanent Water Commission and use it as the instrument for eliciting the cooperation of the Member States in the planning process (p. 12);

3. OMVG should commission a re-evaluation of the plan for the Balingho salinity barrier looking to elimination of the shallow lake contemplated in the present plan (p. 30);

4. OMVG should promulgate and reach agreements among the Member States and the present water users on water rights in the Gambia River Basin before construction starts on any works of infrastructure (p. 31).

B. Recommendations for the Planning Unit

1. In carrying out its work plan, the Planning Unit should place primary emphasis on developing data series to provide a basis for analyzing impacts of potential projects and programs including:

- o Hydrologic data needed for operation of the SSARR Model and for development of a ground water model;
- c Environmental data for assessing impacts on fisheries, other flora and fauna, and public health;
- c Economic data for evaluation of agricultural costs, benefits, and the repayment ability of beneficiaries;
- c Data on soil erosion and sedimentation problems in the basin looking to development of plans for control; and
- o Training staff of ministries and agencies of the Member States to continue the program after the conclusion of the USAID project. (pp. 22-23)

2. As a second priority item, the Planning Unit should develop and maintain contacts with the staffs of the ministries and agencies of the Member States that have responsibilities for activities related to Gambia River Basin development, and with missions of other donor agencies promoting the welfare of the inhabitants of the basins (p.25).

3. The Planning Unit should establish liaison with the staff of OMVS and monitor progress on the integration of OMVS projects into the national economies of the Member States as a guide to what is to be expected to follow Gambia River Basin Development (p. 31).

Recommendations for USAID

1. USAID should consider establishing and financing a West African river basins research facility that can perform studies and research on problems common to the several river basins in the region (p. 32).

2. USAID should see that all field personnel are kept informed of activities pertinent to African River Basin development, such as progress on the work being done under the Settlement and Resources Systems Analysis Cooperative Agreement between Clark University/Institute for Development Anthropology and USAID (p. 300).

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- Volume V Infrastructure (Not Yet Available)
- Volume VI Transport
- Volume VII Environmental and Socio-Economic Impacts of the Programme for Development of the Gambia River Basin
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