

PD-BAG 448

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JUL 28 1975

ACTION MEMORANDUM FOR THE ADMINISTRATOR

THRU: ES

EXECUTIVE SECRETARIAT

FROM: AA/PPC, Philip Birnbaum

SUBJECT: Environmental Assessment of the Senegal River Basin
Development Plan

Problem: Because this proposed grant exceeds \$2.0 million your authorization of the attached Project Paper is requested.

Discussion: The development of the Senegal River Basin has the potential of arresting further incursion of the desert into the three Sahelian countries of Mali, Mauritania and Senegal. Once an ecological balance is restored to this basin, the regulated use of the Senegal River's waters can support vast food production schemes through irrigated double cropping. An indicative basin plan has been drafted with a view to achieving these goals, and endorsed by the regional coordinative development body created in 1972 by the riparian countries, "L'Organisation pour la Mise en Valeur du Fleuve Senegal" (OMVS).

At the OMVS first donor's conference held in Nouakchott in July 1974, some twenty bilateral and international donor institutions expressed interest in participating in developing the resources of the Senegal River Basin. The USG was among these, and among other activities proposed, offered to undertake an assessment of the environmental effects of the major projects contained in the Indicative Basin Plan. This plan extends over the next 35-40 years and includes an upstream regulatory dam; a downstream dam to arrest salt water intrusion; a network of irrigated perimeters covering some 420,000 hectares; and a mainstream navigation system with eight inland ports extending to Kayes, Mali. The financing of certain of these major mainstream projects was fully subscribed at this initial conference, and additional financing has been successfully solicited since then. Combined, they will effect profound changes on the regime of this river, a factor which underscores the importance and urgency of a comprehensive environmental assessment prior to their realization.

An AID-financed study undertaken by the U.S. Bureau of Reclamation to assess the Senegal River Indicative Basin Plan indicates that there are several areas in which major analysis remains to be done. Some of this analysis will be undertaken concurrently with work on major infrastructure projects now underway, but a good portion of the remainder will not be completed until the principal mainstream projects are in advanced stages of design or construction. The beneficial effects of each mainstream project have been assessed, but their composite adverse effects have not yet been evaluated.

Since the Plan concentrates on completion of three of the four major mainstream undertakings during its first ten years, it is crucial that these adverse effects be taken into account and projects or programs designed to mitigate them.

A Project Review Paper outlining the general strategy for this Environmental Assessment was drafted in November 1974, and circulated among the U.S. Environmental Protection Agency, the U.S. Bureau of Reclamation, the U.S. Corps of Engineers, and the World Bank. The comments of these organizations were incorporated into the Project Review Paper approved in January 1975. A design team was recruited in February and went to the Senegal River Basin in March 1975. The team was made up of members of the Corps of Engineers, Bureau of Reclamation, a U.S. private engineering firm, the American Public Health Association, and A.I.D. The team submitted its proposed Terms of Reference for a two-year comprehensive environmental assessment of the Senegal River Basin to the Secretary-General of the OMVS in April 1975. These Terms of Reference were in turn circulated among the ministries concerned in the three riparian countries, and accepted by the OMVS with only a few suggestions. These suggestions were incorporated into the Project Paper which was reviewed at an ECPR held on June 5, 1975. Several further modifications resulted from the ECPR, and certain of these aimed at establishing the mechanism and procedures to assure proper dissemination and full utilization of the findings of this study by the riparian states will be incorporated as conditions precedent in the grant agreement with the OMVS.

The strategy devised addresses the particular characteristics of this river basin which already was found to be in a state of ecological imbalance due to the tremendous pressures from overgrazing exerted upon it during the dry season. This study will assess and weigh the individual and combined environmental effects of the two dams, the scheme of irrigated perimeters now envisaged and the maintenance of a channel for mainstream navigation, in twenty-five areas where these undertakings are deemed to have potential effects. These areas of potential effects include aspects of Public Health, Water Quality and Quantity considerations, factors affecting Plant and Animal life in the basin, and changes in Socio-Cultural Conditions.

A grant will be made to the OMVS to enter into a two-year contract with a U.S. firm or institution, or combination thereof considering the multi-disciplinary skills needed. Based on estimates made in the field and refined in AID/W, it appears that 345 professional man-months will be required, supplemented by 78 man-months of technical and administrative assistance, and 140 man-months of local semi-professional and administrative support. Total cost of this undertaking is estimated at \$2,500,000. The OMVS is establishing an Environmental Affairs Division as an operational bureau within its Secretariat, and the Chief and personnel of this division will work exclusively with the AID-financed contract as the channel for disseminating the results of the study as these come into focus.

Given the nature of this river basin, the magnitude of the projects planned, and the relative speed with which these are being realized, a full-scale environmental assessment appears highly desirable at this time. No other river basin in Africa has profited from such a study at this stage of its development, and as a result most have been characterized by massive ecological problems. Throughout the development of this project considerable discussion was devoted to the feasibility of having such a comprehensive environmental assessment undertaken by a U.S. firm. It is the announced policy of the USG to participate in agricultural development in this basin rather than in any of the major infrastructure projects. The latter will create profound environmental changes, and these are all financed by other donors. However, investigation has shown that environmental assessment has evolved during the last decade as a somewhat particular U.S. engineering specialty, and to attempt to segment portions of this integrated study by project, sector, or donor, would be at the expense of reducing its professional quality and cohesiveness.

From the design team's preliminary assessment it appears that the results of this study will be more applicable to the formulation of projects and programs to mitigate adverse environmental effects within the riparian countries rather than major modification of project by donor countries. In any event, in concert with the OMVS, AID will undertake all steps required to assure other donor acceptance of this undertaking, while the OMVS and each of its member governments will set up the mechanisms to provide for the understanding and ready utilization of its findings. These are to provide the basis for rational decision-making in environmental planning on the part of the African nations affected by changes in the river's regime.

It has been noted that the principal project in the Senegal River Basin's development, the upstream regulatory dam in Mali, has been studied for the past three years by teams from the People's Republic of China. Discussions held in Dakar in April 1975 between the OMVS and the PRC indicated that the PRC proposals for financing and construction of the Manantali Dam were within negotiating range of the OMVS. Should the PRC undertake this \$250 million project as is expected, it will not create a situation in which Section 620 (H) of the Foreign Assistance Act would have to be considered before continuing with this environmental assessment. Here there exists a reverse situation from that described in the FAA for the Manantali Dam, in being the kingpin of the entire development scheme, has all other donor activities in the basin predicated upon its completion within the next ten years.

The results of this assessment will have direct relevance to the strategy to be pursued in the first comprehensive development of a river basin in the Sahel region. The primary goal of such development is the production of surplus crops of food staples by creating reservoirs and regulating the flow of the Senegal River on a year-round basis, thereby allowing the introduction of agricultural practices based on controlled irrigation. As such this study

represents an initial step in the long range rehabilitation of three drought stricken Sahelian states and therefore qualifies for allocation of funds under Section 639A of the Foreign Assistance Act.

Recommendation:

That you approve an allocation of \$2,500,000 from the Disaster Relief Appropriation for the study described above. This activity will be included in the FY 1976 Operational Year Budget under the title "OMVS Environmental Assessment". The funds will allow the OMVS to contract with a U.S. engineering firm and/or institution to undertake a two-year comprehensive environmental assessment of the Senegal River Basin.

Approved: 

Disapproved: _____

Date: 5/11/75

Drafted by: AFR/CWR:HPetrequin:gbm

Clearances:

AFR/CWR:IDCoker (draft) _____

AFR/CWR:CDCapoferri (draft) _____

AFR/CWR:JPatterson (draft) _____

AFR/DP:RHuesmann 10/15 _____

GC/AFR:TBork (draft) _____

AA/AFR:DSBrown _____

*PPC/DPRE:AMHandly RCM _____

GC:CGladson LS _____

SER/ENGR:PStearns r/s _____

AA/AFR:SCAdams ACA _____

AUG 8 3 55 PM '75

EXECUTIVE SECRETARIAT

AUG 8 1975

INFORMATION MEMORANDUM FOR THE ACTING ADMINISTRATOR

THRU: ES

FROM: AA/AFR, Donald S. Brown, Acting 

SUBJECT: Noncapital Project Paper (PROP) for the OMVS Environmental Assessment

This memorandum is to clarify issues which you raised in your review of the subject PROP and discussed with members of my staff. It is to be considered a part of this document and should be referred to for guidance in implementing this PROP. The specific sections clarified and modified are as follows:

- a) Page 22, last paragraph: The process for selection of the contractor will probably not be completed before early 1976, rather than by October 1975 as now stated. Continuing in that paragraph to the top of page 23, full responsibility for monitoring the contractor's performance will not shift entirely to the OMVS but will be accomplished jointly by OMVS and A.I.D. staff working on the OMVS program who by then will be posted in the field.
- b) Page 28, second paragraph from the end, Section D: The last sentence in this paragraph should read: "The contractor shall determine the magnitude of all direct-expense program requirements, and include the expense of these requirements in the breakdown of estimated costs." (in lieu of "...the expense of these requirements in the negotiated fixed compensation.") This is to clarify AID's intent that a cost-plus-fixed-fee type contract between the OMVS and the selected firm is anticipated. To the extent possible the standard procedures of the World Bank will be followed in the selection process of O.M.V.S. and A.I.D.
- c) Page 29, second paragraph, Section (F): The second sentence of this paragraph now reads: "The contractor shall utilize this preliminary schedule to formulate and submit a detailed task schedule within sixty calendar days of initiating the program." The intent here is not to imply that major changes will be allowed in the schedule submitted by the contractor as the basis for his firm proposal. There may very well be desirable modifications in the man-month requirements of the different professional disciplines which come into focus as field experience is gained. The detailed task schedule requested here should essentially be an elaboration in greater detail of the

contractor's original proposal, and modifications made will not reduce the total number of professional man-month requirements.

It is also understood that a Letter of Implementation will accompany the Grant Agreement funding this project, and that within this Letter of Implementation there will be a projected schedule of payments to be made to the contractor based upon a chronological breakdown of estimated costs. Advances made to the contractor to get activities underway and periodically thereafter shall be limited to cash requirements for reasonable periods.

AFR/CWR:HPetrequin:gbm:07-31-75

I. PROJECT IDENTIFICATION

1. PROJECT TITLE
OMVS Environmental Assessment

2. PROJECT NUMBER
625-11-995-617

3. RECIPIENT (specify)
 COUNTRY _____
 REGIONAL AFR/CWR INTERREGIONAL _____

4. LIFE OF PROJECT
BEGINS FY 76
ENDS FY 77

5. SUBMISSION DATE
 ORIGINAL June 1975
 REV. NO. _____ DATE _____
CONTR. PASA NO. _____

APPENDIX ATTACHED
 YES NO

II. FUNDING (\$000) AND MAN MONTHS (MM) REQUIREMENTS

A. FUNDING BY FISCAL YEAR	B. TOTAL \$	C. PERSONNEL		D. PARTICIPANTS		E. COMMODITIES \$	F. OTHER COSTS \$	G. PASA/CONTR.		H. LOCAL EXCHANGE CURRENCY RATES \$/US (U.S. OWNED)		
		(1) \$	(2) MM	(1) \$	(2) MM			(1) \$	(2) MM	(1) U.S. GRANT LOAN	(2) COUNTRY	
1. PRIOR THRU ACTUAL FY												
2. OPKN FY 76	2,500	2,500	423					2,500	423	2,500		
3. BUDGET FY 77	-0-											
4. BUDGET 11 FY												
5. BUDGET 12 FY												
6. BUDGET 13 FY												
7. ALL SUBQ FY												
8. GRAND TOTAL	2,500	2,500	423					2,500	423	2,500		

9. OTHER DONOR CONTRIBUTIONS

10. NAME OF DONOR _____

11. KIND OF GOODS/SERVICES _____

12. AMOUNT _____

III. ORIGINATING OFFICE CLEARANCE

1. DRAFTER
Mary Petrequin
Mary Petrequin
Lois Hobson

TITLE OMVS Coordinator
Project Design Officer

DATE _____

2. CLEARANCE OFFICER
David Shear
David Shear

TITLE Director, AFR/CWR

DATE _____

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL _____

2. CLEARANCES

BUR OFF.	SIGNATURE	DATE	BUR OFF.	SIGNATURE	DATE
AFR/DS	P. Lyman	6/25/75	SER/ENGR	P. Stearns	7/2/75
PPC/DPRM	A. Handly	7/12/75	AFR/DP	R. Huesmann	7/16/75
AFR/GC	T. Bork	7/2/75			

3. APPROVAL AAS OR OFFICE DIRECTORS
SIGNATURE *Samuel C. Adams*
Samuel C. Adams
TITLE Assistant Administrator for Africa
DATE JUL 18 1975

4. APPROVAL AID (See M.O. 1025.1 V1 C)
SIGNATURE *James G. ...*
ADMINISTRATOR AGENCY FOR INTERNATIONAL DEVELOPMENT
DATE 8/1/75

OMVS ENVIRONMENTAL ASSESSMENT STUDY

OMVS ENVIRONMENTAL ASSESSMENT STUDY

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Environmental Program for the Integrated Development
of the
Senegal River Basin

PART I. Project Summary and Recommendations

A. Recommendations

1. The Grantee will be the Organisation Pour La Mise en Valeur du Fleuve Senegal (OMVS). The OMVS Secretariat will execute the program.

2. Cost of Project: \$2,500,000

AID:

Technical Assistance: \$2,500,000 (contract)

Commodities : \$ -0-

Other Costs : \$ -0-

Total Cost to AID : \$2,500,000
(Grant Funds)

OMVS Countries: Mali, Mauritania, Senegal.

-No costs to be incurred.

B. Description of the Project

The OMVS Environmental Study will undertake a detailed analysis of the environmental implications and problems of proposed Senegal River development projects. The study will be carried out by a team of experts under an OMVS contract with one or more U.S. consulting firms. Where possible, these firms will seek to engage appropriate riparian country nationals to assist in the work program. As this study progresses and those aspects which will require monitoring on a continuing basis come into focus, then a subsequent training program for OMVS personnel can be designed.

The project team will consist of the following categories of specialists:

<u>Title</u>	<u>Months Required</u>
Project Director	24
Administrative Assistant	24
Sanitary Engineer	18

<u>Title</u>	<u>Months Required</u>
Water Resource Engineer	18
Irrigation Engineer	12
Transportation	12
Economist	12
Meteorologist	9
Hydropower Engineer	6
Fishery Biologist	24
Game Management Biologist	18
Ecologist/Limnologist	9
Agricultural Scientist	18
Public Health Advisor	21
Parasitologist/Bacteriologist	18
Anthropologist	18
Health Consultant	6
Water Quality Technician (2)	12
Health Field/Lab Technicians	12
Biological Technician	14
Engineering Technicians (2)	28
Computer Technician	12
Technical Editor	6
Technical Writers (2)	24
Secretaries (2)	48
Field Support Staff (10)	140

The study will cover a two year period. At the start the study team will establish a data base to serve as a measure of the effectiveness of the recommended standards in the period following the implementation of the development projects. Following this, the study team will address itself to determining the effects of the construction of the two dams, implementation of the river navigation plan, the irrigation projects, the agricultural development projects, and the operation of the hydroelectric system.

The effects to be studied and evaluated come under the following main headings:

1. Physical changes in the river course due to changed stream flow.
2. Positive and negative aspects of the removal from beneficial use of land flooded by the two dams.
3. Sociological and health effects resulting from resettlement and from displacement of populations in the flooded areas, and impacts, including possible changes in employment and income potential.

4. The effects on spread or inhibition of disease vectors as a result of changes in stream flow, water storage, irrigation systems and flood control.
5. Sociological and economic changes resulting from the establishment of a year around navigation system and the provision of electric power to the developing areas as well as irrigated agriculture.
6. Water quality and air pollution problems resulting from the multi-use operation of the dams.
7. Changes in marine and land animal and plant life and their economic effects, both upstream and downstream from the dams, and the productivity of the new reservoirs that will result, including the potential for new fisheries and aquatic weed growth.
8. Changes in agricultural methods resulting from the availability of surface irrigation and independence from natural river flooding. Included in this would be an evaluation of the positive and negative aspects of the training and retraining requirements for technicians and farmers.

Using modeling and simulation techniques, these environmental impacts and consequences will be predicted for various possible system management alternatives. From these predictions, alternative procedures can be selected for results through design changes in infrastructure, adoption of operational techniques, or restructuring of portions of the development scheme.

As part of this project, OMVS will provide an environmental specialist to work exclusively with the contract team. This specialist will interpret results of the study as well as work into the planning mechanism of the OMVS Secretariat the criteria required to make proposed projects environmentally sound. He will also work closely with expatriate and African technical experts staffing the OMVS Secretariat, especially the juridical expert, to begin the arduous process of institutionalizing through legislation and other controls more systematic checks on the environment in the Senegal River Basin.

C. Summary Findings

Profound environmental and social changes are expected once construction of the major infrastructure and changes in the water regime are completed. Given the fact that the development scheme for the basin has been planned in the absence of an environmental analysis to address these consequences, and that projects are now in planning and design stages without one, the importance and immediacy of this project is reinforced. While basinwide environmental assessment was not originally

included in the planning of the basin development scheme, the OMVS recognizes the importance that such a study will have for the success of the overall plan, and has requested the U.S. to proceed with the analysis. Inasmuch as some of the major infrastructure projects are entering design stages, it is urgent that this study get underway quickly to allow its findings to be taken into account at every level of development and while project planning can be modified to accommodate environmental concerns.

D. Project Issues

A central issue raised by this project was the need for a training component as one way of assuring that OMVS will have the technical and managerial capacity to implement recommendations flowing from this study. This issue has been addressed (see Section IV, 6) by proposing that after the first year of this project, AID, OMVS and the contractor will review the skills and training that appear to be required for both OMVS and the three riparian states. On the basis of that review, AID in consultation with other donors would be prepared to consider assistance for such training. Related to this issue is that of involving nationals from the riparian countries in the work program proposed for this project. This issue reflects the desirability of having Africans (preferably OMVS country nationals) engaged in the work as early as possible, both as a way of drawing on African professional talents, and to assure a continuity in the understanding and progress of the work among the Africans themselves. REDSO has been asked to identify Africans who can participate in this kind of study. These two issues have been addressed in Part I, B, Project Description.

Another issue is that of the importance of donor cooperation both in the study itself and in the recommendations which will follow. Such cooperation will be essential in obtaining critical data on projects and in implementing any recommendation coming out of the study which may affect other donor activities. This issue will be addressed through OMVS consultations with donors about this study, as well as through individual discussions that AID will undertake with donors on the objectives and scope of work for the study. The World Bank has participated in the development of the terms of reference of this study. From its inception to its completion AID will assure, through OMVS to the extent possible and directly to the degree required, that all donors are aware of the implications of this environmental assessment and will cooperate in utilizing its findings as these become known.

COST-PLUS-FIXED-FEE BREAKDOWN AND ANALYSIS OF ESTIMATED COSTS

Environmental Impact Study for the OMVS

Items	Firm Name		Borrower-Country Costs (local currency)	Source-Country Costs (U.S.\$ ^{3/})	Total Costs (U.S.\$)
	Details On Schedule	Man-Months			
1. Overseas salaries at base pay	1	455			634,000
2. Overseas differential, if any					64,000
3. Overhead-overseas (field staff): ^{1/} Percentage rate (100%)					634,000
4. Home office salaries (back-up services)	2	14			26,000
5. Overhead-home office: ^{1/} Percentage rate (____%)					36,000
6. Fixed-fee (Show basis of computation.) 10%		469			139,000
7. SUBTOTAL (Cost per man-month _____)					1,533,000
8. Subcontract costs, if any (Submit details on separate schedule.)					
9. Cost of consultants, if any (Submit details on separate schedule.)		127			370,085
10. Travel and per diem - personnel:					54,000
(a) International travel	3				1,200
(1) Per diem - international	3				5,000
(b) Domestic travel: ^{2/}	3				500
(1) Per diem - domestic	3				
(c) Local travel - borrower country	3				351,000
(1) Per diem - borrower country, local travel & per diem - personnel	3				10,000
11. Transportation - personal baggage	4				32,000
12. Transportation - household effects	4				11,000
13. Transportation - equipment	4				40,700
14. Equipment (detail)	5				20,000
15. Other direct costs:					20,000
(a) Insurance (specify)	6				
(b) Out-of-pocket expenses (Itemize.)	6				20,000
(c) Miscellaneous (Itemize)	6				101,000
16. SUBTOTAL (8 through 15)					1,016,500
17. TOTAL COSTS (1 through 15)		596			2,549,500

^{1/} Overhead: Items included in overhead shall not be included elsewhere in cost estimate. Overseas differential shall not be included in the computation of the overhead allowance.

^{2/} Travel within the source country of the consultant.

^{3/} Exchange rate between local and/or other country currency and U.S. dollars, used to arrive at the total figures on this page and attached schedules, is subject to A.I.D. approval.

PART II. Project Background and Detailed Description

A. Background

The Organisation pour la Mise en Valeur du Fleuve Senegal (OMVS) comprising the three Sahelian states of Mali, Mauritania and Senegal has embarked on a major regional effort which will eventually lead to the integrated development of the vast Senegal River Basin. Central to the realization of this development is the control of the water system through the proposed construction of two major dams, the Diama (Delta) and the Manantali (upper valley) dams. The major social uses which would accrue from these dams have been identified as 1) intensive agricultural irrigation, 2) river navigation, 3) hydro-electric generation, 4) municipal and industrial water supplies, 5) exploitation of minerals, 6) fishing, 7) community development and related areas such as 8) dryland agriculture including livestock and 9) forestry.

AID recently articulated a policy to ensure that the potential environmental aspects of each AID funded capital project are fully reviewed at an early stage of project planning. Comprehensive documentation of high quality environmental assessment is to be made available for joint consideration by AID and Borrower/Grantee Officials.

In line with this policy the Environmental Study Project of the Senegal River Basin Development Plan proposed in this PRP is of high priority and relevance. This study departs from the AID policy in one important respect. That policy requires that the environmental impact study, including an examination of various feasible alternatives, be undertaken before decisions are reached on the construction of the infrastructure.

The OMVS has already made the decision to construct the dams, irrigation works and the navigation facilities prior to AID's involvement in the development program. AID became directly involved as a prospective donor in May 1974 when it was invited by the OMVS to attend a Donor's Conference in Nouakchott, Mauritania, in July 1974. At that time the OMVS was already the recipient of a UNDP financed "Synthesis Study" which brought together the results of a number of prior studies done by various agencies in the last twenty years. The synthesis study presented an integrated basin development program based on the construction of the two dams. The entire program, phased over a 40 year period, would eventually cost about \$3.5 billion. The initial stage based on the construction of the two dams would require an investment of around \$700,000,000.

In reviewing the proposed development program it became evident to AID that few attempts were made to determine the environmental effects, positive or negative, of the infrastructure construction.

The AID delegation at the Donor's Conference pointed out this deficiency to the OMVS and its member states and suggested that a study be undertaken

to examine, in detail, the possible effects of the project and make recommendations to avoid or minimize any serious deterioration of the environment. Subsequently, AID has discussed with OMVS the possibility of financing such a study because of the vast experience and large body of expertise in the field of environmental impact existent in the United States. OMVS has requested such assistance. The study is also supported by some of the other donors who are planning financial support for the infrastructure construction. The study can still influence the design standards for the infrastructure and even, in the event of necessity, propose alternatives to some of its elements.

The Manantali dam, to be constructed on the Bafing River, the principal tributary of the Senegal River, about 83 km above the town of Bafoulabe, is intended to provide a regulated flow of 300 cubic meters per second in the Senegal River which is now subjected to alternating flood and dry periods. The very great changes in the river flow from its natural, unregulated state will result in major changes in the physical environment both downstream of the dam and upstream from the resulting flooding of the storage area. There will also be socio-economic changes, some of which are planned objectives of the proposed development project and others which will emerge as corollaries that require evaluation as to their positive or negative aspects.

The Diama dam, to be constructed in the Senegal River Delta region will be a much smaller structure whose principal purpose is to prevent salt water incursion into the lower Senegal River reaches so as to prevent pollution of municipal and industrial water supply and irrigation systems in the area. Although the effects of the Diama dam on the environment will be considerably less than the Manantali Dam, the storage of water behind the dam will provide a more regular supply of water for the present agricultural, industrial and municipal users. The effects of the flooding of the storage area, even though it is relatively small in size, and the changed character of the river flow in the delta region must be evaluated to determine the balance of positive and negative results.

The OMVS is now moving to develop a master plan for the river basin development and at the same time to implement projects which are key to the plan. Among these latter are the two dams for which the OMVS is now negotiating with prospective donors who would finance the engineering and construction work. At this stage of more concrete planning and implementation, it has become evident that many gaps in data and expertise still must be filled before a more comprehensive development strategy (i.e. Master Plan) can be elaborated. One of the major gaps is the eventual impact which the proposed regional and national projects would have on the environment.

B. Detailed Description

The long-term goal toward which this project and others to be articulated are aimed is the integrated development of the agricultural,

Industrial, power, mining, and navigational potential of the Senegal River basin to improve the quality of life of the basin population.

The sub-sector goal is to promote rational planning and implementation of the Senegal River Basin Development scheme by increasing the planning and implementation capability of the OMVS Secretariat General.

In 1972 the OMVS, a regional organization joining Mali, Mauritania, and Senegal, succeeded two predecessor organizations, the Comité Inter-Etats pour l'Aménagement du Bassin au Fleuve Senegal and the Organisation des Etats Riverains du Senegal (OERS) and became the official organism through which the integrated development of the Senegal River Basin would proceed. During the ten years previous to the formation of the OMVS, many diverse and costly studies had been financed on the development potential of the river basin. The founding of the OMVS marked the conclusion of this preliminary study phase and the initiation of a more serious integrated development planning phase. With this initiative, the OMVS secretariat general's functions will increase significantly to include: 1) studies and analyses necessary for the development of common resources, 2) management of common facilities and resources, 3) harmonization of national and regional planning in relation to national Senegal River Development committees, and 4) coordination of a regional, national or joint project implementation.

The broadened functions of the OMVS secretariat will demand significant technical assistance inputs by the international donors to increase the Secretariat's technical "absorptive capacity".

PROJECT PURPOSE

The purpose of the environmental impacts project is to incorporate into the planning and design stages of the OMVS integrated development scheme, major environmental criteria which would be applicable and required for all proposed development projects in the basin. The project purpose is predicated on the assumption that a modification at any point of the existing water system initiates a whole series of adjustments throughout the entire system until a new equilibrium is reached. These adjustments have both physical and social consequences, some of which are positive and some of which are negative, but all of which need to be anticipated and assessed in the early planning stages. For instance, when a major dam is constructed, what new public health problems may arise from the project? What effect will the development have on the life cycles of resident and sea-run species of fish and other forms of wildlife? What undesirable consequences for vegetation will accompany reservoir development, etc.?

These criteria and standards will serve to optimize the long-term benefits for development projects by insuring that the environmental and social factors are identified and included in the cost-benefit analyses of individual projects to be undertaken. They are not intended to deter

the progress of the integrated development scheme.

The achievement of this purpose would also partially satisfy the broader sector goal of increasing the planning and implementation capability of the OMVS secretariat in order to realize a rational integrated development of the Senegal River Basin.

Incorporation of these considerations into the Secretariat's decision-making structure would permit early planning of the environmental consequences to mitigate or prevent undesirable environmental effects resulting from the proposed projects by pollution control technologies or redesign of the project.

OUTPUTS

The major output of this project will be the two year study of environmental impacts which will identify potential environmental problems connected with each proposed Basin project and provide recommendations for required actions to be taken in the planning of the integrated development of the Senegal River Basin.

The legislation and control technologies which it is hoped would be adopted as a result of the study, will be an eventual medium-term spin-off of the project. The basis for a training component will be reviewed following the first year of work.

INPUTS

The composition of the study team is shown in Part I, B (Description of the Project).

Total cost of the project, including overseas overhead and support will be about \$2,500,000 U.S. dollars.

PART III. Project Analysis

A. Areas of Impact

1. Problem Definition

Ecological changes due to the alteration of the present river regime of flood flows and dry periods are expected to be significant throughout the river basin. The flow alterations will affect a wide spectrum of physical factors, i.e. qualitative parameters of the river water; groundwater levels; climatic conditions; vegetation patterns; aquatic biota and terrestrial animal population. The river's development should also cause significant socio-cultural changes due to modern irrigation methods; stabilization of the basin's population; creation of new industries; and accessibility through dependable river navigation facilities. The basin's development as now projected will result in profound changes of the traditional life pattern on a grand scale.

While most of the benefits of the plan to the three countries are evident, they will be accompanied by unavoidable environmental problems such as the spread of water related diseases, the deterioration of water quality from agricultural chemicals; and adverse effects on fish and wildlife; and aggregate conflicting interests between settled farmers and incoming nomadic populations. Fishing, recession farming and cattle raising have been dramatically affected by a severe drought cycle within the basin. Resultant stresses on the fragile ecology of the riverine zones, savanna zone and the sahel have been extensive. The development of irrigated agriculture has already impacted the quality of water for consumptive uses and the available quantity of water, even for the city of Dakar.

Many of these problems can be minimized or perhaps eliminated by a timely analysis and appropriate changes in the basin development scheme. OMVS engineering studies which have been completed project an abundance of water relative to historical needs. The problem is to create a balance between the introduction of new and competing water uses, while maintaining a favorable environment within the basin for it to serve as a bulwark against further encroachment of the Sahara.

2. Identification of Environmental Impacts

The environmental impacts described herein are limited to aspects occurring within the Senegal River Basin. There will be other impacts resulting from the key projects which will occur beyond the geographic limits of the basin, for example, transmission of hydro-electric power and water.

There are ten areas of environmental impact within which specific problems can be identified and assessed. These are defined as:

River Regime - The hydrological changes resulting from the development plan including withdrawals for agriculture and other consumptive uses, reuse and return flows, evaporation, flooding, sediment transport and siltation, stream bank erosion and basin climatology.

Estuary Regime - Estuarine boundary, flow patterns, tidal exchange and sediment transport within the future saline portion of the basin.

Aquatic Biota - freshwater, estuarine and marine fisheries along with affected biomass, aquatic vegetation and total biological productivity within waters of the basin.

Terrestrial Biota - plants, birds, insects, rodents and other wildlife considered either beneficial or detrimental to the basin ecology.

Agricultural Development - The interrelationships of irrigated perimeters, recession-type farmland, dryland farming and grazing.

Public Health - The incidence and prevalence of both endemic diseases and introduced water-related diseases associated with the resident population, migration, resettlement and water consumption.

Water quality - The physical, chemical and biological changes caused by flow control, withdrawals, return discharges, impoundments, increased evaporation and other hydrological conditions. Includes such factors as salinity, oxygen content, organics, sediment and chemical toxicants.

Groundwater - The quantity and quality of subsurface waters as a result of enhanced infiltration conditions and irrigation.

Socio-cultural - The changes in settlements, relocations, standards of living, population density and cultural patterns.

Municipal and Industrial Development - The availability of water, allocation of usage, waste disposal practices and changes in transportation modes.

To simplify the description of anticipated environmental impacts, the ten previously mentioned areas have been combined into four classifications:

- (1) Public Health
- (2) Physical and Direct Use (Agricultural Development, Municipal-Industrial Development, River and Estuary Regimes, Water Quality, Groundwater).

(3) Plant and Animal Life (Aquatic Biota, Terrestrial Biota)

(4) Socio-cultural Conditions.

The identification of environmental impacts within these four classifications is shown in the Tables No. 1 through 4 as they relate to specific factors associated with the key projects. Where no magnitude is indicated, either no impact is believed to occur, or it is insignificant. It is anticipated that detailed assessment of impacts may alter the magnitude or importance considerably.

Important impacts are given further explanation herein. The listing is not intended to be all inclusive but consists of areas of primary concern to OMVS.

(a) Public Health

The evaluation and assessment of the prevalence and incidence of human and animal diseases within the basin is of extreme importance. The Senegal River Basin harbors serious endemic and epidemic diseases which have the risk of being extended and intensified as a result of environmental changes produced by the basin development scheme unless appropriate preventive, control and/or eradication measures are taken. Specific problems are:

- The creation of impoundments of freshwater and construction of irrigation canals will extend the favorable habitat for mosquito breeding and thus the prevalence and incidence of malaria and all mosquito-borne diseases. Malaria is present throughout the basin with high rates of endemicity. Higher water tables in the delta, formation of bodies of water by irrigation return flows, storage of water for irrigation and municipal supply all assist in dissemination of existing vectors.

- Schistosomiasis is prevalent in the Senegal Basin, affecting the population along the river. Distribution of the diseases is dependent on snails. The incidence of urinary schistosomiasis varies from over 40% of the upper basin population to about 10% in the delta. Intestinal schistosomiasis has been found in several isolated areas. Expanded freshwater habitat for the snails combined with an influx of population could result in a serious health problem. Factors affecting the prevalence of the disease include the degree of salinity, the organic matter content of water, extent of surface water created, degree of turbulence, the varieties of intermediate hosts and area sanitation practices.

- The expansion of irrigation systems may have a number of negative consequences in terms of pollution. The waters can become contaminated with chemical fertilizers and pesticides and

with the germs which cause diarrheal diseases such as salmonellosis and cholera. Due to the lack of sources of potable water in rural areas, water for human consumption may be drawn directly from contaminated irrigation canals or ditches. Even where the irrigation water is not consumed directly, the pollutants may leach to underground water tables and eventually reach the river itself which is the major source of drinking water for the cities and larger settlements in the basin. This problem of potential water contamination by chemical or organic pollutants is especially serious given the totally inadequate number of water treatment plants serving the OMVS member states.

- Riverine areas with swift currents such as the upper Senegal River and its tributaries are important in the prevalence and incidence of onchocerciasis (river blindness). The disease is caused by a nematode worm transmitted to humans by a fly which breeds on plants and rocks in highly aerated water. Impact on the spread of the disease may be substantial with the construction of the Manantali Dam as a high rate of carriers is known to occur in the upper basin. Although the swiftness of the current of the main stream will be diminished as a result of impoundment, the rate of flow in primary canals of the irrigation system may favor breeding of the fly vector.

- Epidemiological data on yellow fever in the river basin indicate the presence of susceptible populations in percentages varying with the date of the most recent vaccination campaigns. Yellow fever and other arboviruses are present in the primate populations of forests in the Kedougou region and conceivably the Manantali site. The disturbance expected from building the dam, removal of forest habitat and perimeter construction in Mali can cause the migration of virus carrying primates. The same projects will bring susceptible human populations into the area. From this proximity, the classic sylvatic-urban double cycle of disease transmission, may be created.

- Malnutrition and undernutrition can be anticipated with the transition from traditional agricultural methods to modern farming and animal husbandry techniques. Threats to the local population's nutritional status include: temporary loss of farmland during project construction; reduction in available fish production, disruption of food output during the shift from rainfed to irrigated farming methods.

- The risk of expanding diseases among livestock and other domestic animals due to environmental changes will be a serious problem. For example, animals suffer from a form of schistosomiasis and the risk of increasing the disease among livestock as a result of expanding snail population; Changes in water distribution may also bring about increased breeding of the tsetse fly which carries trypanosomiasis. This disease restricts the movements of herders who try to protect their animals from exposure. Although at present the animal form of the disease is more threatening than the human form, human trypanosomiasis could also be expanded.

- Last but not least the anticipated population growth in the basin will result in increased pollution of the environment together with a greater risk of expanding diseases associated with crowding, such as tuberculosis and venereal diseases.

(b) Physical and Direct Use

This classification deals with the impacts created by agricultural development, livestock raising, municipal and industrial activities, changes in the river and estuary flow regimes, water quality and changes in groundwater.

- Existing trees within the irrigated perimeters will be removed during the land clearing adversely affecting desirable reforestation practices.

- Control of the historical overbank flooding will affect the adjacent lands which depend on annual inundation. Regulation of the river flow and construction of irrigated perimeters will eventually reduce the annually flooded area from about 600,000 hectares to some 100,000 hectares. Examples of impacts are: loss of existing forests, wildlife habitat, rural water supply, and groundwater recharge.

- The use of fertilizers, pesticides and other agricultural chemicals will affect the quality of the river water especially in the marigots and local depressions which receive the polluted water. These storage pools are generally used for domestic and livestock purposes.

- Controlled river flow will be beneficial and attract all types of animal life, including pests and predators. River regulation will be an important factor to crop damage.

- Modern irrigation techniques and higher crop yields will result in larger and more prosperous settlements. These, in turn, will require better roads and communications, sanitary and water supply facilities, schools, dispensaries and social services.

- Quantity and quality of groundwater may be affected by the regulated stream flow and the increase in irrigated land. The pool behind Diama Dam extending more than 400 kilometers upstream, may raise the water table in the flat delta land and the middle valley. The same increase may occur within the perimeters utilizing year-round irrigation. Dissolved salts in the soil may be leached to the surface, due to impermeable soils and restricted drainage. Crop yields and drinking water from wells will be affected accordingly.

- Municipal water supplies of towns presently dependent on the river (including Dakar) may be altered. The water quantity

will be more plentiful, but the quality may deteriorate due to pollution and salinity. Treated water supplies will be required for those towns and for the new settlements.

- New industrial and agricultural processing plants (canneries, sugar, rice mills, tomato paste plants, dairies, abattoirs, and tanneries) can be anticipated as a result of expanded agriculture. Such plants may pollute the river unless their discharges are regulated.

- Navigation activities including channel straightening and maintenance dredging will affect downstream siltation, the quality of water and consumptive uses.

(c) Plant and Animal Life

Regulation of the previously uncontrolled river flow should have a stabilizing and generally beneficial effect on all terrestrial biota. The previous periods of alternating floods and droughts limited animal productivity through destruction of habitat, drowning and subsequent lack of food in the dry season. Establishment of irrigated perimeters and the creation of marshy areas around the Diama and Manantali lakes will increase the food sources and productivity of most terrestrial and amphibian biota. The intended change of the river regime and the agricultural development will have both positive and negative impacts on the aquatic biota.

- The Diama Dam can be expected to create heavy aquatic growth, especially after reservoir stabilization is achieved through releases from Manantali Dam. An accompanying expansion of marshy areas can be anticipated. The delta is now an important staging area for migratory birds and the expanded habitat should permit greater concentration of waterfowl and other birds.

- The Diama Dam and reservoir will create a breeding ground for insects and mollusks (snails) which are both food for larger animals and carriers of diseases.

- The estuary and consequently the habitat of estuarine fish and crustaceans will be reduced by the construction of the Diama Dam. Heavy aquatic growth in the upstream reservoir could also become a nutrient trap and reduce the fertility of the estuarine environment.

- Freshwater biota will benefit from a larger habitat upstream of Diama Dam. However, freshwater fish which pass through the dam during the annual flood may become trapped and die from saline toxicity during the dry season in the estuary.

- The impacts of the lower basin development on the bird and wild-life sanctuary at Djoudj, close to the Diama Dam, require careful evaluation to identify adverse effects and potential benefits.

- Diama Dam may have both beneficial and adverse impacts on rare animal species such as manatees, hippopotami and crocodiles. It is believed that manatees migrate a considerable distance upstream during the high water period and return to spend part of their life cycle in the ocean. If that hypothesis is correct, manatees that would go below the dam during high water would be unable to return to the river. Conversely, the improved grazing in Diama lake may cause crocodiles and hippopotami, which are reported to appear occasionally during the rainy season, to find permanent habitat in Diama Lake. It is also possible that they may be eliminated due to major reduction of their existing flood-induced habitat.

- Irrigated agriculture in the desert environment will attract support and concentrate all types of terrestrial fauna, including pests. The current invasion of rodents, driven from surrounding dry lands, is an example of this impact. Other troublesome life forms that may proliferate in the expanding irrigated perimeters are quela-quela birds, doves, snails, locusts, mosquitoes and insects.

- Residues from agricultural chemicals (fertilizers, pesticides, herbicides) could pollute the river and marigots, thus entering the foodchain of fish, fish-eating birds and humans.

- Indigenous vegetation including weeds such as nutgrass (which proliferates under the same conditions as rice) will continue to thrive in the irrigated fields.

- Dredging and disposal of dredge spoil will adversely affect fisheries and fish habitat.

- Some traditional fishing methods, techniques and equipment will not be compatible with increasing boat traffic.

- Certain types of heavy aquatic growth in Diama Lake could interfere with navigation and the operation of the boat locks.

- Controlled river flow and the reduction of historical overbank flooding will seriously affect fish productivity. Fish now depend on flooded areas for food and spawning. The eventual reduction of this area from 600,000 hectares to 100,000 hectares will have proportionate impact.

- Creation of the reservoir behind Manantali Dam will destroy the riverine habitat and displace the terrestrial animals within the area of influence. The large impoundment will also be beneficial to most aquatic biota including vectors.

- Water releases from the deep part of the Manantali reservoir could discharge oxygen deficient water into the river below during power generation. The lack of oxygen would adversely affect aquatic biota, particularly fish.

- Controlled releases from Manantali Dam will stabilize the amount of freshwater entering the estuary thereby reducing seasonal fluctuation in salinity. Freshwater fish that have passed over the Diama Dam may benefit from this stabilization, whereas, estuarine biota may not.

(d) Socio-Cultural Aspects

An important consequence of the changes in the basin's land use due to development is the necessary departure from the traditional culture patterns. The practices of flood recession agriculture and nomadic pastoralism are not easily displaced by irrigated agriculture and permanent resettlement, even with the potentially increased yield and improved standard of living. Problems of this nature which must be assessed and resolved for the key projects include:

- The closing or changing of traditional migration routes across the river by maintaining high water levels and constructing dikes or other livestock barriers can create resentment, interrupt construction, or disturb inter-tribal relations.

-Preemption of recession agriculture crop land to provide freshwater impoundments or to construct irrigated perimeters may create problems in land reform and usage which will be difficult to resolve even with the benefits accrued to the population involved.

- The migration of people into the delta region and the irrigated perimeter may create new urban areas and resultant infrastructure. For many, this will be a total change in cultural values as a new standard of living and property ownership are obtained. The success of this transition and the approach to best achieve the rate of development are major sociological concerns.

- Most post-flood recession farming zones involve subsistence-level cropping by traditional methods. The transition to modern farming techniques and agricultural economics will encounter varying degrees of reluctance due to change and the total risk required from the subsistence farmer.

- The alteration of the river flow flood pattern and development of larger communities along the river can be expected to change the fishing patterns, methods and marketing demands. An understanding of these changes and methods to perpetuate a viable fishing industry is essential.

- Certain groups of inhabitants dependent upon fishing will be affected by decreased income due to changes in fish species and abundance. Relocation or development of new income sources may be required.

3. Available Literature and Data

A careful distinction is necessary in order to apprise the contractor of the usefulness of the information available for the environmental assessment. A large portion of the existing documentation deals with highly specialized and localized subjects which lack sufficient comprehensiveness for full environmental assessment purposes. Other documents are based on outdated information and therefore do not reflect the changes caused by the drought period of the last few years.

For these reasons a distinction is made for the Scope of Work between topics for which sufficient, comprehensive "hard data" is judged to be available, and those topics which are covered by scattered, random literature. The latter type of topics will require a special effort in the form of literature review, excerpting of data and/or securing new field data.

The major source of published information is the OMVS Documentation Center located at St. Louis. Since its establishment in November 1970, the Documentation Center has systematically collected and indexed all reports, maps, specialized information and studies pertaining to the Senegal River development. An annually updated index, published in French, lists the available documents in three ways: bibliography, authorship, and subject matter. Each document is referenced and classified as a report, project design, legal text, monograph, map or thesis. The bibliographic index contains the following elements for each entry: subject (key word), author, title, source, date, number of pages, original language and abstract. The author index cross-references the document number. The analytical index cross-references by key words the available material on each subject.

There are some additional studies available at the OMVS offices in Dakar and St. Louis. Other pertinent data which may not be available through the OMVS Documentation Center can be found at the various ministries of health, agriculture, and rural development of the three OMVS-member countries and at the University of Dakar.

There are also a number of summary reports and analyses of the basin development plan: Beyrard; Senegal-Consult; UNDP Synthesis and Evaluation Mission (Hubbard report); and the U.S. Bureau of Reclamation study. A mathematical model of the river basin hydrology has also been prepared. Selected data references

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are shown in the preliminary environmental assessment which designed the foregoing Scope of Work for the contract team.

The contract team should also familiarize itself with the data available on environmental assessments completed elsewhere on rivers, lakes and reservoirs in tropical Africa, such as the post-impoundment environmental study done by the Smithsonian Institution on Lake Volta, Ghana. Other studies have been carried out on the Bandama Dam in the Ivory Coast, and on the Niger River and Lake Chad. Certain members of the contract team may find it worthwhile to visit projects in other river basins in the West Africa Region prior to or during their work in the Senegal River Basin.

B. Financial Analysis and Plans

This project will be carried out under a host country contract with grant funds of 100% of the cost by AID funds. Because the element of the contract is a study, a cost/benefit analysis has not been provided. The basis for a real cost/benefit analysis will come with the application of analyses resulting from this study to individual projects. An economist will be part of the study team and will take this aspect of the study's implications for projects into consideration.

PART IV. Implementation Plan

A. Administrative Arrangements

1. Recipient

This study will be done under a contract between OMVS and a contractor to be mutually selected by OMVS and AID. The Organisation pour la Mise en Valeur du Fleuve Senegal (OMVS) was formed in 1972 as a successor to the Organisation des Etats Riverain du Fleuve Senegal (OERS). The OMVS membership includes Senegal, Mali, and Mauritania (three of the seven Sahelian drought stricken states). Guinea, a member of OERS, has not joined, but membership is open to it should it wish to be acceded.

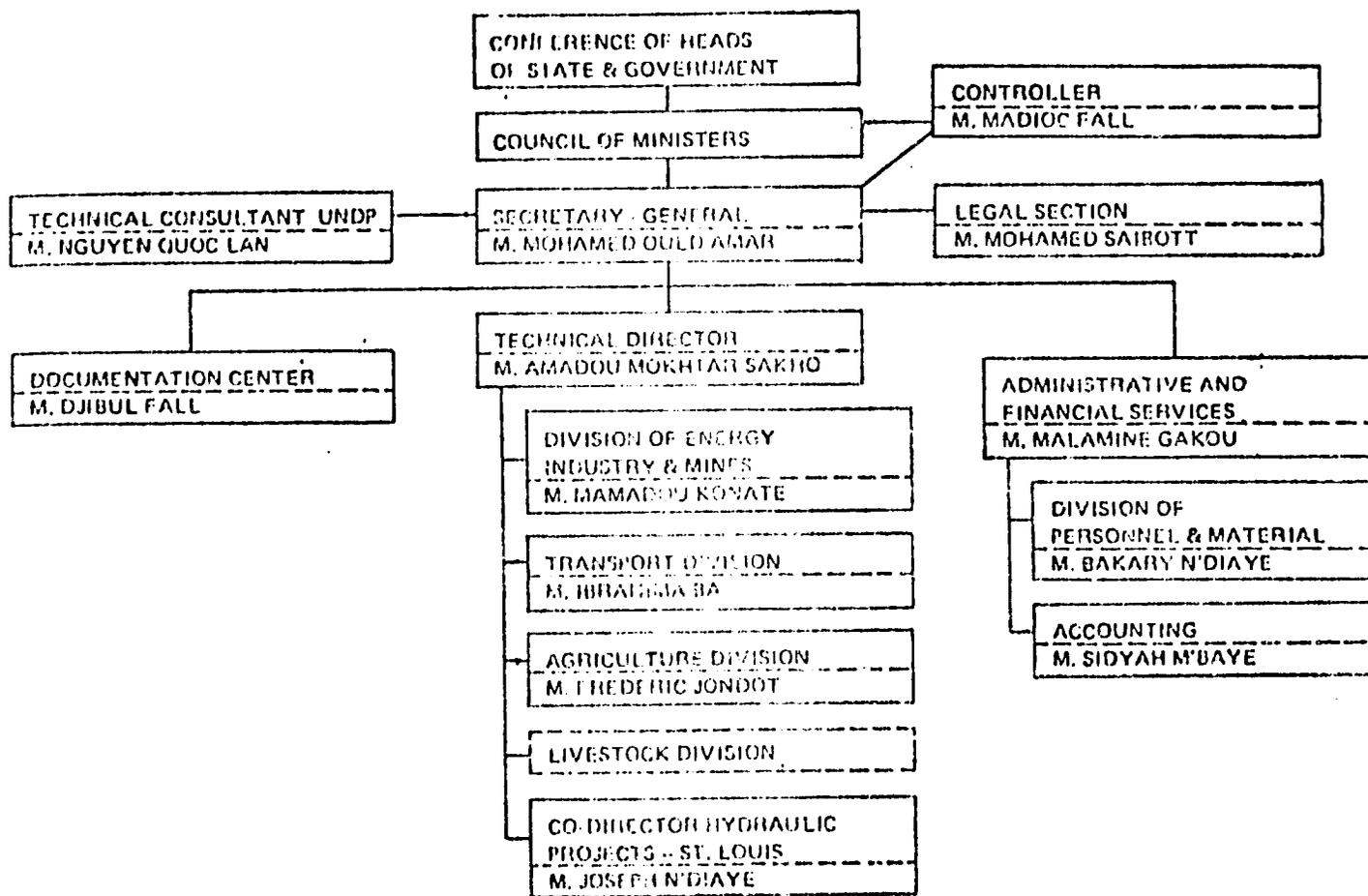
The basic objective of the OMVS is to develop the resources of the Senegal River Basin so they can be used to free the population of the member states from recurring cycles of drought and hunger and to reduce to the minimum the restraints of climate on food production. To obtain these objectives they propose an integrated plan for the development of the Senegal River Basin. The plan is based on the UNDP financed Synthesis Study, which is the analysis and synthesis of some \$10 million worth of studies on various aspects of the Senegal River Basin executed over the past twenty years. AID contributed to the synthesis effort by providing the services of a legal specialist, development systems advisor, and water resources planner, and is continuing to analyze the OMVS and its Indicative Basin Plan through a PASA with the U.S. Bureau of Reclamation.

The analysis of the jurisdiction, powers, and procedures of the OMVS indicates that from the point of view of formal structure the OMVS is one of the most effective and efficient river basin organizations that has been established by river basin states in any part of the world. Because of its structural flexibility and advanced theoretical basis, the OMVS may make decisions in accordance with the most recent technical data available by internal resolutions that may be changed if later data indicate that such a change would be appropriate. Because these internal procedures are binding on member states, this procedure avoids the necessity of entering into a formal international convention based on presently available technical data that might tend to restrict the optimum progression toward the basic objectives. In essence the OMVS, unlike the majority of other international organizations dealing with the regulation of international rivers, can react to data as it becomes available much in the way that a private corporation might so react. Its member states have adopted the relatively advanced theory of international river law known as the "integrated equitable utilization" or "community" theory, with respect to their mutual rights and obligations.

The following is an organizational chart of its present structure:

O.M.V.S.

ORGANIZATION



OMVS - PRESENT ORGANIZATION

OMVS is presently structured in three main levels. The Conference of Heads of State is the highest level and decides questions of general economic policy. Its decisions must be unanimous and they become binding obligations of the respective states. The Chairmanship of the Conference is rotated.

The next level is the three-man Council of Ministers which is comprised of one individual of ministerial rank appointed by each state. The Presidency is rotated on a two year basis. This body defines the priorities for development projects, authorizes the acceptance of

loans and grants and apportions repayment obligations among the member states. Here too, actions must be by unanimous vote. The Council President is authorized to represent OMVS with respect to national and international loans and to negotiate and execute treaties within Council directives. Final decision on all matters beyond the policy and fiscal limitations of the Council must be made by the Conference of Heads of State.

The Secretary General is the Executive Officer of the OMVS, and the Secretariat presently contains all staff of OMVS except the Audit Commissioner. The Secretary General is appointed for a three year term by the Council of Ministers and is responsible for executing Council decisions, preparing budgets for Council approval and hiring personnel below the Director level. Directors are named by the Council, and the Audit Commissioner by the Council President.

One of the unique features of the OMVS agreement is that each of the three nations assumes, as a general obligation of the nation as a whole, its share of repayment costs for the OMVS project and that any two of the three nations guarantee the share of the third, should it for some reason default. Another unique feature is that a precedent has been established for allocating repayment shares for main project costs on the basis of repayment capability, rather than on a strict ratio of benefits basis. This precedent was achieved in connection with the agreement for sharing of costs of the river navigation project between the three nations. The nations have also declared the Senegal an international river and have agreed to establish a navigation company which will operate the river ports and barges. Under the OMVS concept, it appears that charges will be made for OMVS services such as firm water supply in the river for irrigation, hydroelectric energy and river transport and that an attempt will be made to set these charges at a level which will pay for operation and for project debt service. However, if for any reason it is not possible to do this and still provide the services at a level which will permit actual use, part or all of the debt service component could conceivably be picked up by the treasuries of the three nations.

2. A.I.D.

The contractor selection process will be undertaken jointly by OMVS and AID. AID will publish a request for proposals in the Commerce Business Daily for interested firms to submit in both English and French their experience and professional competencies in undertaking comprehensive environmental assessments of this nature. OMVS will participate both in the pre-selection and in the final selection and negotiations from the Short List as part of an educational process. Once the selection process is completed by October of this year as presently scheduled, then

full responsibility for monitoring will shift to the OMVS Secretariat which will have a newly created Division of Environmental Affairs headed by an officer whose exclusive responsibilities will be working with this AID-financed contract team. AID will receive copies of the periodic progress reports to be submitted to OMVS by the Contractor, along with OMVS comments and reaction.

B. Implementation

A comprehensive environmental assessment shall be prepared to ascertain actions which would mitigate or minimize adverse impacts and maximize beneficial impacts resultant from the proposed developments in the Senegal River Basin. The assessment shall be conducted and prepared in accordance with the AID publication, Environmental Assessment Guidelines Manual, September 1974. Specifically the contractor shall provide equipment and personnel necessary to perform the following services.

1. Review Existing Data Base.

Within the ten major areas of environmental impact, data on the following parameters is judged to be sufficient for direct input to the assessment. The contractor shall review the available data references on these specific parameters to obtain sufficient baseline data as required for assessment purposes.

River Regime	: Preliminary engineering of Manantali Dam and Diama Dam; hydrologic basin model; climatology and basin hydrology.
Estuary Regime	: Estuarine boundary; preliminary engineering on navigation.
Aquatic Biota	: Insufficient.
Terrestrial Biota	: Insufficient.
Agricultural Development	: Master plan of the irrigated perimeter program.
Public Health	: Insufficient.
Water Quality	: Insufficient.
Groundwater	: Quantity, aquifer characteristics.
Socio-cultural	: Insufficient.
Municipal and Industrial Development	: Insufficient.

2. Collect Additional Data.

The contractor shall be required to collect additional field data and/or conduct a comprehensive literature review to supplement the existing data for assessment purposes. Within the ten major areas of environmental impact, the following parameters require field data and/or literature review:

- | | |
|--------------------------------------|--|
| River Regime | : Flow/operational regime; releases; consumptive uses; natural losses; returns; sediment transport; bank erosion, and allocation of purpose. |
| Estuary Regime | : Flow patterns; tidal exchange and sediment transport. |
| Aquatic Biota | : Fisheries; biomass; vegetation and biological productivity, both fresh-water and estuarine. |
| Terrestrial Biota | : Important plants, birds, insects, rodents and wildlife. |
| Agricultural Development | : Farming practices, water needs, and chemical uses. |
| Public Health | : Incidence of endemic diseases and water related diseases, vector control, and animal diseases. |
| Water Quality | : Physical, chemical, biological and relationships to water quantity. |
| Groundwater | : Qualitative analyses for potable use. |
| *Socio-cultural | : Settlement changes, relocations, standards of living, population density and cultural patterns. |
| Municipal and Industrial Development | : Water allocation, water usage, water disposal and transportation modes. |

* (Predominantly literature review.)

3. Mathematical Modeling.

Utilizing the existing hydrologic mathematical model as a base physical analogue of the river basin, the contractor shall expand the model to accommodate programs for water quality and flow/operational regime.

The expanded model shall permit analysis of future conditions of flow, storage, losses, areas of flood inundation, withdrawals, returns and water quality for the entire basin. The expanded program shall possess the flexibility to simulate any scheduled activities of development and simultaneously consider the interrelationships between water quantity and water quality for those schedules. Field data obtained on water quality and flow/operational regime shall be used to verify the model. The contractor shall utilize the verified model to predict critical water quality and flow conditions.

4. Determine Interrelationships.

The contractor shall analyze the probable interrelationships between water quality/quantity and the (a) ecological effects, (b) socio-cultural effects, and (c) public health impacts utilizing the output from the expanded mathematical model. Those interrelationships shall be assessed to the full extent of the program flexibility specified.

5. Assess Impacts.

Based upon the existing data collected by the supplemental field data/literature review, the output obtained from the expanded model, and the determination of interrelationships (1-4 above), the contractor shall make a comprehensive assessment of the impacts associated with the proposed basin development. Assessment of the impacts shall be categorized as specified in the Guidelines for both the primary aspects (Manantali Dam, Diama Dam, River Navigation and the Irrigated Perimeter Program) and the secondary aspects (hydro-electric power, mining and industry, etc.). The contractor shall include Section 2.2.

6. Prescribed Actions.

Based upon assessment, the contractor shall outline feasible actions to mitigate or minimize adverse impacts or to maximize beneficial impacts. The contractor shall further identify relative priorities of those actions and prepare an implementation schedule in accordance with the proposed sequential basin development.

7. Prepare Final Report.

The assessment shall be incorporated into report form in accordance with the specified Guidelines. One hundred copies in the French language shall be submitted to the OMVS Secretary General.

8. Present Findings.

The contractor shall make presentations of his interim findings to the OMVS whenever requested by the OMVS Secretary General in addition to a final presentation subsequent to submission of the final comprehensive written report.

C. Manpower Requirements

Due to the size and complexity of the Senegal River Basin, a multi-discipline environmental team will be required. Technical and professional personnel in the natural, social, medical and physical sciences must combine their efforts to enable a comprehensive environmental assessment.

It is suggested that the contractor provide the following professional personnel possessing the individual specific experience and general background knowledge shown.

A multidisciplined environmental team of fully qualified and experienced technical and professional personnel in the natural, social, medical and physical sciences shall be assigned by the contractor to make the comprehensive environmental assessment. The contractor's team should include the following personnel, possessing the individual specific experience and general background knowledge shown:

Project Director: Experience in conducting environmental assessments, river basin studies, and project management. Knowledgeable in the fields of public health, ecology, hydraulic/hydrologic engineering and sociology.

Administrative Assistant: Trained and experienced in business management and operation of service contracting. Knowledgeable in accounting, personnel relations, purchasing and management information systems.

Sanitary Engineer: Professional engineer with experience in water quality, public health and treatment systems. Knowledgeable in ecology, sociology and mathematical modeling.

Water Resource Engineer: Professional engineer with experience in river basin studies, mathematical modeling and hydraulic engineering.

Irrigation Engineer: Professional engineer with experience in the planning, operation and maintenance of irrigation projects preferably in lesser developed countries.

Transportation Engineer: Professional engineer with general experience in the transportation field, including planning and operation of port facilities, river navigation, river channelization and highways.

Hydro-power Engineer: Professional engineer experienced in the planning, construction and operation of hydro-electric projects, including dams and power production and distribution.

Meteorologist: Experienced in the climatological and meteorological aspects of environmental changes, with a background in agro-climatology or agro-meteorology.

Economist: Experienced in the economic analysis of integrated river basin development, preferably in developing countries.

Fishery Biologist: Experienced in West African fisheries and their social relationships. Knowledgeable in limnology, aquatic vegetation, zoology and aquatic entomology.

Game Management Biologist: Experienced in West African wildlife and habitat. Knowledgeable in terrestrial vegetation, zoology, ornithology and rodent control.

Ecologist/Limnologist: Experienced in general biology, mathematical modeling and environmental assessments. Knowledgeable in fisheries and wildlife.

Agricultural Scientist: Experienced in West African crop production, soils and agricultural chemicals. Knowledgeable in entomology, agronomy and animal husbandry.

Public Health Expert: Experienced in public health, tropical medicine and management of tropical public health programs. Knowledgeable in vector/intermediate host control, epidemiology, sanitation and water quality .

Parasitologist/Bacteriologist: Medical doctor experienced in West African and tropical epidemiology. Knowledgeable in public health, biology and sanitation.

Anthropologist: Experienced in West African (Sahelian Zone) applied anthropology. Knowledgeable in social change as applied to rural development.

Health Consultant: Experience to be identified by needs of the environmental program.

The contractor shall additionally supply the following technical personnel who possess the capabilities shown:

Water Quality Technician: Water sampling and physical, chemical and biological water analysis.

Health Field/Lab Technician: Medical data and literature review.

Biological Technicians: Biological sampling, data gathering and identification.

Engineering Technicians: Hydrologic surveys, engineering science, drafting and computer application.

Computer Technician: Computer programming.

Technical Editor: Organization, writing, editing and production of technical reports.

Technical Writers: General scientific writing with English-French translation.

Secretaries: Dictation, transcribing, typing in both English and French.

Field Support: Personnel necessary for field activities: i.e. drivers, interpreters, laborers, cooks, etc.

All professional personnel shall have a working proficiency in both speaking and reading the French language and the Project Director shall be fluent in the French language. Key personnel shall preferably be experienced in foreign assignments. Utilization of qualified resident personnel of the riparian countries shall be encouraged.

The following are considered to be key personnel: Project Director, Administrative Assistant, Sanitary Engineer, Water Resource Engineer, Irrigation Engineer, Transportation Engineer, Agricultural Scientist, Public Health Expert, Parasitologist/Bacteriologist, Anthropologist, Economist.

D. Direct Cost Requirements

To allow the contractor flexibility in completing the environmental assessment, the equipment and facilities requirements have not been specified. The contractor shall identify those requirements as will be necessary to plan, conduct, and complete the total program.

Evaluation of those requirements should carefully consider the geographic, communication and logistic factors associated with the program. Limitations in transportation facilities, supply outlets, living quarters, commercial services, and communication facilities will necessitate specific coordination. The broad and often remote geographical area encompassed by the river basin will require extensive logistical planning to accommodate the program needs. The contractor shall determine the magnitude of all direct-expense program requirements, and include the expense of these requirements in the negotiated fixed compensation.

E. Coordination Requirements

OMVS will appoint a staff coordinator to work with the contractor for the program duration. The contractor shall report monthly to the OMVS Secretariat through the coordinator regarding the program status and contractor findings. A written interim

status report shall be submitted to the OMVS Secretariat at the completion of the first twelve months of the program. The contractor shall also submit any additional reports on the program as requested by the OMVS Secretariat.

Coordination with governmental agencies of the OMVS member countries will be conducted through the OMVS. As a condition precedent in the grant agreement funding this study, the OMVS will create a Division of Environmental Affairs as the sixth of its operational divisions within the OMVS Secretariat. The Chief of this new division will be the OMVS Coordinator working with the contract team. This Division of Environmental Affairs will assure that as the findings of this study come into focus they will be transmitted to the OMVS member countries as the basis for national or regional programs to mitigate adverse environmental effects. Also as a condition within the grant agreement, each OMVS member country will outline the channels by which all recommendations emanating from this study will flow directly from the OMVS to the individual ministries concerned with their implementation. To supplement these measures aimed at assuring that the results of this study will be readily utilized, the contractor when so directed by the Secretariat shall coordinate his activities to assist the OMVS-member countries in this regard.

F. Schedule of Completion

The contractor shall begin work immediately upon receipt of written notification to commence work from OMVS. The contractor shall complete the environmental assessment and submit the final report twenty-four (24) months subsequent to the date of the written notice.

The attached schedule defines the major program activities and the duration of individual personnel assignments. The contractor shall utilize this preliminary schedule to formulate and submit a detailed task schedule within sixty calendar days of initiating the program.

PART IV. Evaluation Arrangements

After one year, the preliminary conclusions of the study will be reviewed by OMVS and AID. On the basis of this review, (a) the original scope of work will be reviewed and revised as necessary, (b) OMVS will assign additional personnel as needed to coordinate the balance of the study with OMVS organizational and operating sections, and (c) a staffing and training program for OMVS will be developed as the basis for a separate, complementary assistance effort.

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ENVIRONMENTAL PROGRAM - EMPLOYEE SCHEDULE

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
FEDERAL ELEMENT	<p>Project programming and computer runs Model programming and computer runs Data gathering & laboratory review Assessment analysis Report preparation</p>																							
Project Director	-----																							
Administrative Assistant	-----																							
Sanitary Engineer	-----																							
Water Resource Engineer	-----																							
Higher Biologists (2)	-----																							
Non-management Biologist	-----																							
Biologist/Limnologist	-----																							
Agricultural Scientist	-----																							
Public Health Expert	-----																							
Parasitologist/Bacteriologist	-----																							
Anthropologist	-----																							
Health Consultant	-----																							
Fiber Quality Technician	-----																							
Health Field/Lab Technician	-----																							
Health Research Technician	-----																							
Biological Technicians (2)	-----																							
Engineering Technicians (2)	-----																							
Computer Technician	-----																							
Technical Editor	-----																							
Technical Writers (2)	-----																							
Secretaries (2)	-----																							
Field Support (10)	-----																							
Man-Months/Manch	4	7	20	31	50	30	31	31	32	33	32	32	34	34	34	35	25	17	18	18	10	10	7	7
Man-Months - Accumulative	4	11	32	64	94	124	155	186	218	251	283	315	349	383	417	452	178	495	513	531	541	551	558	565

ANNEX A

THE OMVS - AN ANALYSIS OF ITS JURISDICTION, POWERS AND PROCEDURES

A. General

The OMVS is a regional organization¹ which has as its primary goal the development of the Senegal River for purposes of irrigation, navigation and hydroelectric power.² With its power to make decisions that are binding obligations of the Member States, its three-tiered decision-making structure and the broad powers of delegation among the three tiers, it is potentially, from the point of view of formal structure one of the most effective and efficient river basin organizations that has been established by river basin states in any part of the world.³

The OMVS's most valuable asset is its decision-making structure and its ability to make binding decisions at the Council of Minister level.

The treaties pursuant to which the OMVS was created are "La Convention Relative au Statut du Fleuve Senegal" (hereinafter referred to as the "Statute") and "La Convention Portant Creation de l'Organisation pour la Mise en Valeur du Fleuve Senegal" (hereafter referred to as the "Convention - OMVS"), which were both signed on March 11, 1972.

The ratification documents necessary to bring the aforesaid treaties into effect were deposited by Senegal⁴ and Mauritania⁵ on October 13, 1972. The ratification by Mali was accomplished on November 23, 1972.⁶ Thus the de jure creation of the OMVS has been effected in accordance with both international law as well as the internal laws of the Member States.

See footnotes on pages 3 and 4.

Member States may withdraw from the Organization by giving six months notice but such withdrawal does not affect obligations undertaken by the OMVS prior to the giving of notice.⁷ This withdrawal, moreover, does not necessarily affect rights and obligations under the Statute which can be denounced by a Member State only after a period of ten years following its effective date.⁸

Footnotes. on pages 2 - 3.

1. The predecessor organization the "Organization des Etats Riverains du Senegal (OERS)" included Guinea as well as the Member States of the OMVS. While the de jure and de facto existence of the OERS continues as a topic of conversation in some circles, it would appear that the OERS has been effectively dissolved in conformity with its constitutive document. Article 38 of the "Statut de l'Organisation des Etats Riverains du Senegal." ("OERS Statute") provides that a Member State of the Organization may withdraw by giving one year's notice, with the condition that such withdrawal does not affect prior obligations. On March 11, 1972, all member States of the OERS, with the exception of Guinea, denounced both the OERS Statute as well as the 1963 Convention Relative à l'Aménagement Général du Bassin du Fleuve Senegal, and the 1964 "Convention Relative au Statut du Fleuve Senegal"; as Article 14 of the 1964 Document, which is the fundamental constitutive document, allows for its denunciation after an expiration of five years from its effective date (with a provision for one year's notice) all three Member States appear to have effectively withdrawn from the OERS and, by denouncing its constitutive document in conformity with its provisions, caused the de facto and de jure dissolution of the OERS.

2. See second prefatory clause of the Statute.

3. Indeed, the OMVS is almost a text book example of an international river basin organization, but for the fact that one of the basin states (Guinea) has not yet joined the organization. (Article 15 of the Statute and Article 18 of the Convention - OMVS provide for her joining the OERS if she so desires).

See generally, Garretson, Hayton and Olmstead, The Law of International Drainage Basins, pp.133-146 (Oceana 1967); Utton, "International Water Quality Law," 13 Natural Resources Journal 282 (1973); Honon, "The Lower Mekong River Basin," 5 International Lawyer, 796, 803-07

4.

Evidence of the ratification appears in the Official Journal of the Republic of Senegal, July 26, 1972; Law 72-71, Law 72-73.

5. Evidence of due ratification appears in the Official Journal of the Islamic Republic of Mauritania, July 18, 1972; Law 72-140.

Best Available Document

B. Jurisdiction and General Powers of the OMVS

The treaty provision pursuant to which the OMVS was formed is Article // of the Statute. As this article provides for the creation of an organization to carry out the purposes of the Statute, "the primary jurisdiction" of the OMVS appears to cover all matters which relate to the development of the Senegal River within the political boundaries of the Member States. However, Article First of the Convention - OMVS provides that the organization is charged with "any technical or economic mission that the Member States collectively desire to confer upon it" (Author's translation). This would appear to make the general jurisdiction of the OMVS extend to areas other than river development, without limitation.^{9.}

As for the general powers of the OMVS, the following are the most significant: (1) the power to create obligations which are binding on the Member States;⁽¹⁰⁾ (2) the power to promote and coordinate both studies and working projects for the development of the river;⁽¹¹⁾ (3) the power to accept grants as well as technical assistance;⁽¹²⁾ and (4) the power to borrow money.⁽¹³⁾ These two latter powers were expressly given to the OMVS by an amendment to the Convention - OMVS dated April 13, 1973. This amendment has been ratified by all the Member States.¹⁴

Footnotes on Pages 3-4-5

6. The Official Journal of the Republic of Mali containing the ratification was not available, as of the date of this report, as the Centre de Recherches d'Etudes et de Documentation sur les Institutions et la Legislation Africaines (CREDILA) at the Law Faculty of the University of Dakar. Mali's due ratification documents have, however, been submitted to the OMVS.

7. See Convention - OMVS, Article 21.

8. Statute Article 17.

9. The USAID sponsored Poultry Projects are examples of the broad scope of OMVS jurisdiction.

10. Convention - OMVS, Articles 5 and 6.

11. Convention - OMVS, Article 1 (2).

12. Convention - OMVS, Article 1.

13. id.

14. Evidence of due ratification has been deposited with the Government of Mauritania.

C. Specific Powers and Procedures of the Institutions of the OMS

There are three institutions which are empowered to act on behalf of the OMS: the Conference of Heads of State and Government (the "Conference"), the Council of Ministers (the "Council"), and the Office of the Secretariat General. Inasmuch as the Conference has no regularly scheduled meetings, the following discussion will stress the powers and procedures of the two permanent organs of the organization. With regard to the Conference, however, it is important to note that:

- it must act with the unanimity of its members,¹⁵
- It is the highest decision-making institution within the organization,¹⁶ and
- It decides questions of general economic policy and the extent of the organization's jurisdiction.¹⁷ Moreover, its decisions, as well as those of the Council, become binding obligations of the Member States.¹⁸ According to the By-laws of the Conference, Member States are obligated to attend all sessions of the Conference.¹⁹

15. Convention - OMS, Article 4, By-Laws of the Conference, Article 4.

16. Convention - OMS, Article 3.

17. Id.

18. Convention - OMS, Article 5.

19. By-Laws of the Conference, Article 4.

1. Powers and Procedures of the Council

a. Powers

The Convention - OMVS gives the Council broad powers to assure an equitable and efficient development of the River.⁽²⁰⁾ The Council is the decision-making organ of the OMVS, charged with the responsibility of defining the priorities for development projects. It has the power to authorize the acceptance of loans and grants⁽²¹⁾ as well as that of apportioning the fiscal responsibilities of each Member State to the Organization.²² The single most important aspect of the Council's relationship to the Member States is that, in the event the Council makes a decision, this becomes a binding obligation of the Member States by virtue of Article 8 of the Convention - OMVS.

Thus the Council has the power to authorize projects, arrange for financing, and apportion the responsibility for financing such projects in such a way as to bind the Member States to the commitment. It should be noted that the binding effect of these obligations may extend even beyond a State's membership in the OMVS if such obligations were incurred prior to withdrawal.⁽²³⁾

20. Convention - OMVS, Article 3.

21. Convention - OMVS, Articles 1 and 8.

22. Convention - OMVS, Article 8, Financial By-Laws, Article 2.

23. Convention - OMVS, Article 21.

b. Procedures - The requirement of unanimity

The Council meets annually unless called into special session by one of the Member States⁽²⁴⁾. Attendance of both regular and special sessions is mandatory.⁽²⁵⁾ The requirement of unanimous attendance and unanimous vote in order for the Council to make any decision is stressed at many points both in the Convention - OMVS and in the By-Laws of the various organs.⁽²⁶⁾

This requirement of unanimity thus necessitates the approval of all the Member States prior to the undertaking of projects, and therefore would seem to avert any question of the organization's invasion of the sovereignty of any of the Member States.

c. Selection of Membership on the Council

Although the person selected by each Member State as its representative on the Council must be a Minister or a person of similar rank and prerogatives,⁽²⁷⁾ neither the Convention - OMVS, nor the By-Laws of the various institutions of the OMVS provide a method for the selection of the Ministers who make up the Council's membership. Moreover, there are no provisions in the aforesaid documents which establish the duration of a Minister's appointment or the method for terminating such appointment. The actual selection of the Representative on the Council therefore appears to be left to the discretion of each Member State.

d. Authority of the President of the Council

The Convention - OMVS provides that the President of the Council⁽²⁸⁾ holds this office for a period of two years (rotated among the Member States). He has the authority to represent the Council, with respect to all matters concerning the Senegal River, in its relations with international or national lending institutions.⁽²⁹⁾ He also has the

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- (24) Convention-OMVS, Article 10, By-Laws of the Council, Article 1.
(25) Convention-OMVS, Article 10, By-Laws of the Council, Article 4.
(26) Convention-OMVS, Article 10, By-Laws of the Council, Articles 4 & 11.
(27) Convention-OMVS, Article 8, By-Laws of the Council, Article 4.
(28) Convention-OMVS, Article 9, By-Laws of the Council, Article 5.
(29) Convention-OMVS, Articles 11 & 16.

power to negotiate and sign treaties in the name of the Member States with respect to the above matters as long as it is done within the directives of the Council.⁽³⁰⁾

o. Limitation on the Authority of the Council

1. By-Law Provisions

The most significant limitation on the authority of the Council to undertake projects that would effectuate the purposes of the OMVS, aside from the requirement of unanimity, is contained in Article 14 of the Council's By-Laws which were adopted by the Council on July 24, 1972: "Any general question of order of the Council's deliberations involving: (a) the necessity for a new orientation of the policy of cooperation and development of the OMVS other than that established by the Conference; (b) an absence of unanimity; (c) new financial undertakings of more than 100 million frs CFA, shall be submitted by the President of the Council to the President of the OMVS, who will determine, within the limits of his powers, the opportunity for either resolving the question or of submitting it to the Heads of State of the Member States either directly or at the next session of the Conference of Heads of State" (Author's translation).

It is unclear what exactly is meant by subparagraph (c) above; as the wording of the limitation is directed to "new financial undertakings of more than 100 million frs CFA" it could be interpreted as allowing for the Council's approval of no single project whose cost would exceed the stated amount. On the other hand, it could also be interpreted as placing an annual total limitation on OMVS projects.

Clarification of this point would be desirable, however, it is important to note that this financial limitation is found in the By-Laws of the Council and not in either the Statute or the Convention - OMVS. Thus, it is a limitation that the Council has placed on itself and is in the process of being removed by the Council by an amendment of its By-Laws.

(30) Convention-OMVS, Article 10.

11. Consideration of Local Laws of the Member States

The documents attesting to the due ratification of the Statute and the Convention - OMVS stated as being in conformity with the constitutions of the ratifying Member States, established the de jure existence of the OMVS.

As the Convention - OMVS gives both the Conference and the Council the power to make decisions which operate as binding obligations of the Member States, it would seem that every firm decision (as opposed to a general policy statement) is made an obligation of the Member States just as effectively as if the decision was contained in a separate treaty, duly ratified by the Member States. Because in each Member State duly ratified treaties prevail over other laws,⁽³¹⁾ internal laws which conflict, or are inconsistent, with the Council's decisions would, therefore, appear to be superseded by such decisions; the Member State or States having such conflicting or inconsistent laws would then appear to have the responsibility to revise their internal laws to conform to the Council's decision.

2. Responsibilities of the Secretariat General

The Convention - OMVS provides that the executive powers of the organization are in the office of the Secretariat General, headed by the Secretary General who is appointed by the Council for a three years (renewable) term.⁽³²⁾ Except in his country of origin the Secretary General has the right of diplomatic privileges and immunities.⁽³³⁾

(31) Constitution of the Islamic Republic of Mauritania, Article 46; Constitution of the Republic of Senegal, Article 19; Official Journal of the Republic of Mali, Ordonnance no.1 (Provisional Constitution) November 28, 1968. The provisional constitution of Mali contains no express provisions to this effect, but implies the principle in several places.

(32) Convention-OMVS, Article 12.

(33) Convention-OMVS, Article 12 (as amended on April 13, 1973).

The amendment appears to confer diplomatic privileges and immunities not only on the Secretary General himself but on other Agents of the Secretariat as well.

It is his responsibility to apply the decisions of the Council and/or its President.⁽³⁴⁾ He prepares the budget for Council approval,⁽³⁵⁾ hires the personnel⁽³⁶⁾ (with the exception of his directors, who are named by the Council upon his proposal and an audit commissioner who is named by the President of the Council),⁽³⁷⁾ and serves as permanent secretary to the Council.⁽³⁸⁾ Among his more important duties are: (a) the gathering of data concerning the river,⁽³⁹⁾ (b) the preparation of integrated studies and suggesting projects for the development of the resources of the river,⁽⁴⁰⁾ and (c) the direction and coordination of the activities of his directors.⁽⁴¹⁾ He also is charged with the responsibility of preparing, at the request of one or more of the Member States, feasibility studies relative to development of the river. By virtue of a resolution adopted by the Council in July, 1972, the Secretary General is also authorized to negotiate for grants and loans.⁽⁴²⁾

The greatest possibility for both coordinated planning and effective implementation are in the office of the Secretariat General. Acting pursuant to decisions made by the Council (and therefore binding obligations of the Member States), the office of the Secretariat could expand its staff to deal with problems of integrated planning, regulation of future agreed-

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- (34) Convention-CM/S, Article 12, By-Laws of the Secretariat, Article 2.
 (35) Convention-OMVS, Article 13, By-Laws of the Secretariat, Article 6.
 (36) Convention-OMVS, Article 12, By-Laws of the Secretariat, Article 4.
 (37) Convention-OMVS, Article 12, By-Laws of the Secretariat, Article 4, By-Laws of the Council, Article 18.
 (38) By-Laws of the Secretariat, Article 12.
 (39) Convention-OMVS, Article 11.
 (40) Id.
 (41) Convention-CM/S, Article 12, By-Laws of the Secretariat, Article 2.
 (42) Resolution no. 7/72 CM-SE (July, 1972).

upon water allocation systems, etc., as such problems arise.⁽⁴³⁾

The present staff of the Secretariat consists of approximately 100 persons, excluding those persons "seconded" to the OMVS by organizations such as UNDP, FAO, USAID, and FAC. This staff ranges from directors of projects, soil scientists, and engineers, to stenographers, switchboard operators, and guards. The staff is located at the organization's headquarters in Dakar, the documentation center in Saint-Louis, as well as at the various agricultural project centers such as Guede (Senegal), Kaedi (Mauritania) and Sano (Mali).⁽⁴⁴⁾

D. Coordination between National and Regional Planning

A "National Planning Committee for the Development of the Senegal River" has been established in each of the Member States. Each Committee is composed of representatives of the various planning agencies of the Member States. The chief role of the committees will be to co-ordinate planning on the national level with the integrated development of the river basin. It should be noted that these three committees might be able to coordinate such matters as issuance of water use permits in each of the Member States in accordance with any water use allocation formula established by the Council or by subsequent treaty.

(43) An example of the operating procedures of the OMVS, as well as the relationship between the Council and the Secretariat, is the action taken by the Council in its July, 1972 meeting with respect to the Delta Dam and the ports at Saint-Louis, Kayes and Ambidodi by Res no. 9/72 OM-SE. Studies of the aforesaid projects were done for the OMVS under the Administration of the Secretariat. The Secretariat then compiled the reports for review by an ad hoc Commission of Experts composed of OMVS personnel as well as experts from each of the Member States. After their review, the Commission delivered a report to the Council which adopted the substance of the recommendations of such report. The example of the decision-making process of the OMVS, from the administration of the studies by the Secretariat, the review by a commission of experts, to the ultimate decision on policy by the Council, demonstrates the smooth functioning of which the organization is capable.

(44) See Resolution 8/2 OM-8D adopting the budget prepared by the Secretariat for the fiscal year ending June 30, 1973.

It is also possible that these committees can be used to assist ⁱⁿ the adoption of any internal legislation necessary to implement the projects of the organization.

In addition to the foregoing, the OMS is considering establishing procedures to keep the various national institutions within each Member State informed as to its activities. One suggested method for disseminating the information would be to publish and circulate a report after each session of the Council of Ministers. The report could contain resolutions adopted by the Council. In those cases in which the Council deems it suitable, the resolutions adopted could be in tentative form, requesting comments from any interested national agency. If no comments are forwarded to the Council within a pre-determined period of time, the resolutions would become effective.

ANNEX B

**THE RIGHTS AND OBLIGATIONS OF MEMBER STATES OF THE CLVS
CONCERNING THE USE AND DEVELOPMENT OF THE RIVER**

A. Theoretical Basis of the Rights and Obligations of the Member States

1. The Four Principal Theories of the Rights of States with Respect to International Rivers (45)

Historically, states have referred to four different theories in their efforts to resolve differences concerning the use of international rivers: (1) the theory of absolute territorial sovereignty, permitting the upper riparian to use the river without regard to the rights of its co-riparian; (2) the theory of absolute territorial integrity, giving a lower riparian state the right to the uninterrupted and unchanged flow of the river; (3) the theory of limited territorial sovereignty, permitting riparian states to use an international river as long as such use does not prevent reasonable use by coriparians, and (4) the theory that will be referred to in this report as the "community" or "integrated equitable utilization" theory, calling for the planned cooperative development of a river basin as a unit, without undue emphasis placed on national boundaries.

It is apparent that the first two theories are more productive of creating conflicts than of solving them: an upper riparian might use the first theory to develop or perhaps even to divert an international river in a manner which frustrates the lower riparian's historical uses; a lower riparian might urge the second theory to prevent even a reasonable although now, use of the river by an upper riparian.

It is equally apparent that of the third and fourth theories, it is the fourth which provides the most equitable and efficient method for river basin development. Too much is left to chance with the third theory: What is a "reasonable" use? Will a state find itself unable to use the river because its co-riparian has a claim to most of the water because it began using the water first? Will land-use or navigation projects planned at the national level fail because when the project

(45) See, e.g., Utton, *International Streams and Lakes*, 2 *Water and Water Rights* 403 (R. Clark, ed. 1967).

is able to efficiently use the water another state has already perfected a claim to the water by the doctrine of prior appropriation? The fourth theory, which has been referred to above as the integrated utilization or community theory, unlike the others, offers basin states the opportunity to plan for the reasonable development of an international river. Instead of individual basin states incurring substantial capital expenditures for projects only to discover that such projects conflict with another state's existing use of the river, states are able to coordinate their plans to accommodate as closely as possible their desired uses of the river. Although reaching agreement as to the specifics of cost allocation, water allocation and water quality of an international river is never an easy task, attempting such agreement would appear vastly preferable to the potential conflicts, waste of water and waste of capital which arise all too frequently as a result of the first three theories.

2. Sources of International Law Relative to the Four Theories(46)

There are at least two general sources of international law concerning the use of international rivers: formal international agreements, and "binding custom". To discover the latter, one refers to authorities such as opinions of domestic and international tribunals, executive pronouncements, state practice, international agency practice, the writings of scholars of international law, and statements by private international bodies.

a. The first theory, that of absolute territorial sovereignty has little, if any, international support. Although the United States, with its poorly conceived "Harmon doctrine", referred to the theory early in its negotiations with Mexico concerning the Colorado and the Rio Grande rivers, it soon abandoned this theory. At present, there are almost no states relying on this theory.

b. The theory of absolute territorial integrity also has little, if any, international support. It has, in fact, been rejected by at least one international commission (in the case of the 1925 dispute between Egypt and the Sudan) and by domestic tribunals.

(46) Id., Hayton, The Formation of the Customary Rules of International Drainage Basin Law, The Law of International Drainage Basins, 834-60 (Oceana, 1967); Lipper, Equitable Utilization, the Law of International Drainage Basins, 18-40 (Oceana, 1967)

c. The third theory, that of limited territorial sovereignty has a great deal of international support. It has been used by the Permanent Court of International Justice (international commission of the River Oder case), international arbitration panels, (Lake Lanoux Arbitration) by governments in negotiating treaties (in the dispute between Chile and Bolivia concerning the Lauca River) and by numerous scholars of international law. It should be made clear, however, that this third theory has evolved as the law for settling disputes and disagreements that have already arisen between co-riparians. It is to the fourth theory that one must look for the method of preventing such conflicts from arising at all.

d. The theory of "integrated equitable utilization" or the "community" theory is founded on the basic international legal principle expressed in the Charter of the United Nations as well as in other international agreements of cooperation among states. It has its more specific source (47) in Article XXXI of the rules adopted by the International Law Association in Helsinki at its 52nd Conference in August, 1966 hereafter referred to as the "Helsinki Rules". The writings of many legal scholars also suggest the desirability of the integrated development of international rivers, preferably by a regional association charged with the responsibility of such development.

The theory is also strongly supported by the report of the Panel of Experts to the Secretary General of the United Nations on integrated River Basin Development (Revised ed. 1970)

(47) Even though the Helsinki Rules are commonly regarded as being based upon the "equitable utilization theory", the reference in Article XXXI to a "joint agency" to resolve questions relating to the "future utilization of the waters of an international drainage basin" as well as the comments to such Article, indicate a leaning to the "community theory."

3. The Theory of International River Basin Law created by the OMVS

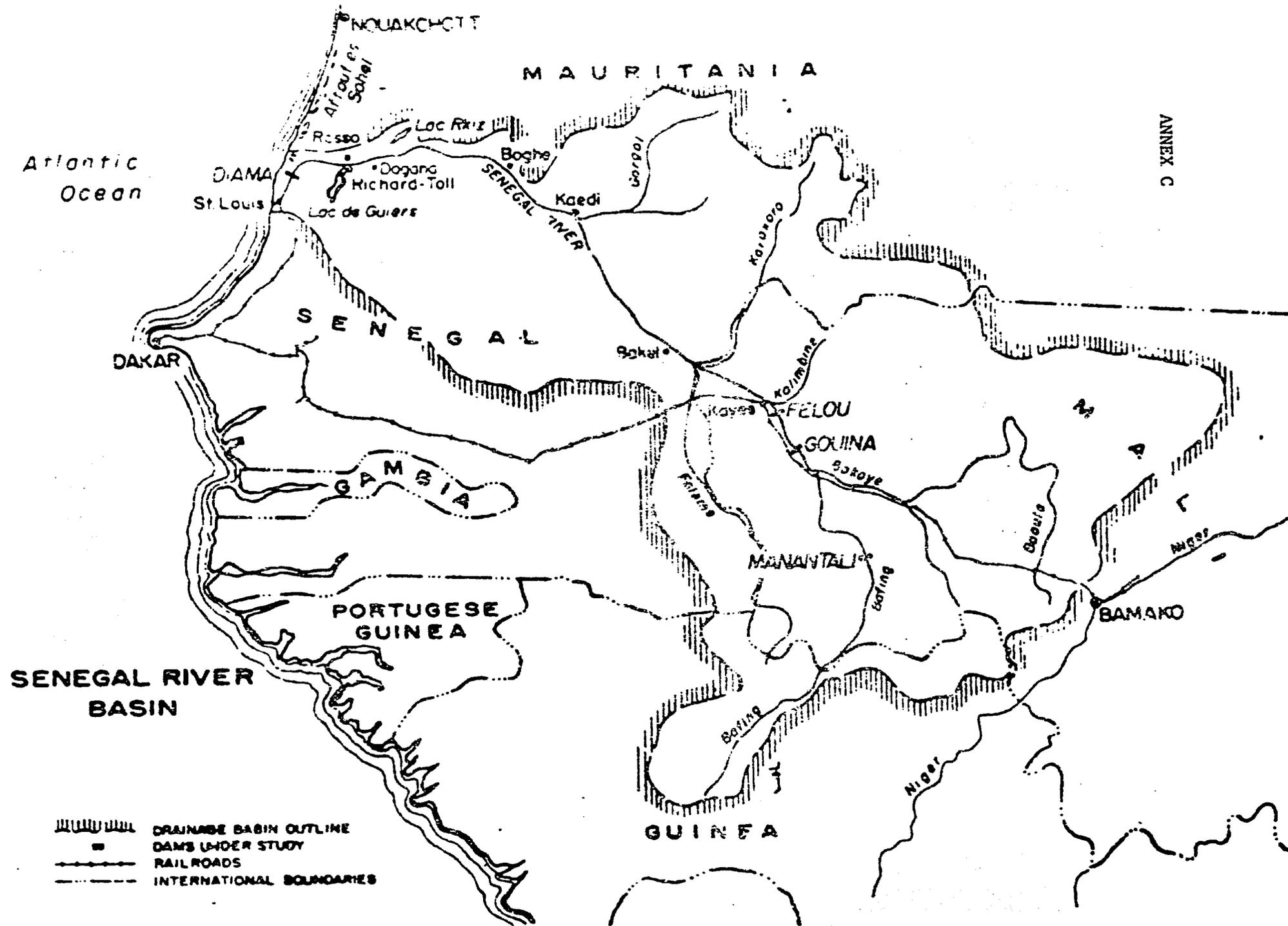
The express language of the documents creating the OMVS, as well as the underlying spirit of cooperative development on the part of the Member States, seems to indicate clearly that this organization has been founded upon the integrated utilization of community theory of international water law.

The statute expresses almost with its first words the desire for the "coordinated development of the Senegal River and the rational utilization of its natural resources" (Author's translation), and in Article 2 of the Statute, this desire for integrated development is repeated: "The States of Mali, Mauritania and Senegal solemnly affirm their desire to establish a close operation for the rational utilization of the resources of the Senegal River and to guarantee freedom of navigation and equal treatment for persons using the River" (Author's translation).

Article 2 of the Statute provides for the "equality of treatment for users of the River" and in Article 4 of the Statute, the Member States have adopted the advanced idea, merely suggested by the Helsinki Rules (48) of prior consultation and approval for projects constructed on the river. Article 11 of the Statute provides for the creation of a regional organization charged with implementation of the treaty, and the Convention - OMVS establishes an authoritative organization for integrated river basin development. This is very much in accordance with the community theory in its most advanced form.(49)

(48) Article XXIX of the Helsinki Rules suggests only that notice be given by the State proposing the construction.

(49) see e.g. Utton, *op.cit.supra*, note 1.



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ANNEX D
PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AID 1020-28 (1-73)
SUPPLEMENT 1

Environmental Program for the
Integrated Development of the Senegal River Basin

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project: From FY 76 to FY 78
Total U.S. Funding: \$2,500,000
Date Prepared: _____

Project Title & Number: _____

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>To develop the agricultural, industrial, power, mining and navigational potential of the Senegal River Basin over the next 30-40 years.</p>	<p>Measures of Goal Achievement: (A-2)</p> <ul style="list-style-type: none"> -major infrastructure in place. -400,000 ha. cultivated by irrigation. -industrial and mining occupations developed. -port facilities in place and in use. -outmigration reduced by percent. -food imports reduced by percent. -unemployment reduced by percent. - exports increased by percent. 	<p>(A-3)</p> <ul style="list-style-type: none"> -reports and statistics submitted by appropriate ministries and OMVS Secretariat in the areas of industrial development, agriculture, employment, imports/exports, etc. -site inspections. 	<p>Assumptions for achieving goal targets: (A-4)</p> <ul style="list-style-type: none"> - that funds, technical assistance, and manpower will be available to facilitate the development plan.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 76 to FY 78
Total U.S. Funding \$2,500,000
Date Prepared: _____

Environmental Program for the

Project Title & Number: Integrated Development of the Senegal River Basin

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p> <p>To increase the planning and implementation capability of the OMVS Secretariat in the area of environmental concerns.</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <ul style="list-style-type: none"> -OMVS will be reviewing existing and proposed projects for their environmental impact. -OMVS will be seeking to modify and incorporate recommendations from the study. -OMVS will have an environmental coordinator within the Secretariat. 	<p>(B-2)</p> <ul style="list-style-type: none"> -- Discussions with OMVS Secretariat and review of OMVS plans and programs. - Person designated as environmental coordinator within Secretariat. - Discussions with donor community regarding OMVS projects. 	<p>Assumptions for achieving purpose: (B-4)</p> <ul style="list-style-type: none"> -That the study will not result in unmanageable financial and technical recommendations which may preclude any further actions by OMVS or donors. -That OMVS will seek to implement recommendations of study. -That donor community will cooperate in objectives of study and recommendations.

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AID 1020-28 (11-73)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Environmental Program for the
Project Title & Number: Integrated Development of the Senegal River Basin

Life of Project:
From FY 75 to FY 78
Total U.S. Funding: \$2,500,000
Date Prepared: _____

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <ul style="list-style-type: none"> - a two year study of environmental inputs which will identify potential environmental problems connected with each proposed Basin project and provide recommendations for required actions to be taken in planning of the basin. - adoption of environmental legislation and control technologies. - establishment of a basis for a training component in key skill areas which will be required by OMVS to carry out an environmental program. 	<p>Magnitude of Outputs: (C-2)</p> <ul style="list-style-type: none"> - technical team consisting of 500 man months of work. 	<p>(C-3)</p> <ul style="list-style-type: none"> - specification in contract and review of personnel participating in study. 	<p>Assumptions for achieving outputs: C-1</p> <ul style="list-style-type: none"> - That the appropriate categories of specialists can be obtained.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 76 to FY 78
Total U. S. Funding \$2,500,000
Date Prepared: _____

Environmental Program for the
Integrated Development of the Senegal River Basin

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Inputs: (D-1)</p> <ul style="list-style-type: none"> - A technical team with specialties in the areas discussed under Project Description, Part I, B. - An environmental expert to OMVS. 	<p>Implementation Target (Type and Quantity) (D-2)</p> <ul style="list-style-type: none"> - One specialist in OMVS responsible for environmental concerns. 	<p>(D-3)</p> <ul style="list-style-type: none"> - Contractual reports and on-site visits. - Reports from OMVS. 	<p>Assumptions for providing inputs: (D-4)</p> <ul style="list-style-type: none"> - That technical experts can be identified and hired.

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