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TECHNICAL ANALYSIS OF THE HEALTH COMPONENT

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GLOSSARY OF ACRONYMS USED IN THE HEALTH COMPONENT ANALYSIS OF THE IDP

FRENCH	ENGLISH	MEANING
VS	*HC*	- *Volet Sanitaire* *Health Component*
SSP	*PHC*	- *Soins de Santé Primaire* *Primary Health Care*
OCCGE		- *Organisation pour la Coordination et le Contrôle de la lutte contre les Grandes Endémies (Organisme Inter_Etats)* *Organization for Coordination and Control of Endemic Diseases (Regional Organisation)*
CILSS		- *Comité Inter-Etat de Lutte Contre la Sécheresse au Sahel* *Sahelian Inter-Governmental Drought Committee*
MOS	*MOH*	- *Ministère de la Santé* *Ministry of Health*
	CDC (U.S.A.)	- *Centre pour le Contrôle des Maladies* *Disease Control Center (Atlanta- Georgia)*
OMS	*WHO*	- *Organisation Mondiale de la Santé* *World Health Organization*
PLCO	*OCP (Upper Volta)*	- *Programme de Lutte Contre l'Onchocercose* *Onchocerciasis Control Program*
FVR	*RVF*	- *Fièvre de la Vallée du Rift* *Rift Valley Fever*
ORANA (Senegal)		Organisme de Recherches sur - *Organisation pour la Recherche Alimentaire et la Nutrition en Afrique* *Organization for Food and Nutrition Research in Africa* l'Alimentation et la Nutrition Africaines
	TRC	- *Commission Technique* *Technical Review Committee*
PEV (Mali)	*EPI*	- *Programme Elargi de Vaccination* *Expanded Program for Immunization*
	SMO (USAID/Dakar)	- *Bureau d'Appui aux Projets* *Support Management Office*

UAR	*RSU (OMVS)*	- *Unité d'Appui Regional* *Regional Support Unit*
SLAP (Senegal)		- *Service de Lutte Anti-Paludique* *Malaria Control Service of the University of Dakar*
CNH (Mauritanie)		- *Centre National d'Hygiène* *National Hygiene Center*
CERMES (Niger)		- *Centre d'Etudes et de Recherche sur la Méningite et la Schistosomiase* *Center for Research on Meningitis and Schistosomiasis*
	GOM	- *Gouvernement du Mali* *Government of Mali*
INRSP (Mali)		- *Institut National de Recherche en Santé Publique* *National Institute for Public Health Research*
PDS (Mali)	*HDP*	- *Projet de Développement Sanitaire* *Health Development Project (World Bank)*
IRTO (Ivory Coast)		- *Institut de Recherche sur la Trypanosomiase et l'Onchocercose* *Research Institute on Trypanosomiasis and Onchocerciasis*

3.5. THE IDP HEALTH COMPONENT

3.5.1. Overview

Recent evidence of the increased prevalence of schistosomiasis among people living near the reservoir created by the Selingue Dam in Mali indicates that development projects which emphasize dam construction and increase dependence on irrigated agriculture present certain health risks to the populations. Similar problems have followed water management efforts in the Nile basin and in the Lake Volta Area. Such deleterious health effects may or may not be counterbalanced by improvements in nutritional status resulting from increased local food production and consumption.

USAID believes that all practical measures should be taken to assure that IDP activities do not adversely affect people's health and that food production results in an improved nutritional status of the project population. To this end, the IDP health component (IDP/HC) will institute a surveillance system to monitor selected diseases and nutritional status among populations directly involved in USAID-funded activities. Following the surveillance program, the IDP/HC will help to control disease whose incidences have been shown to increase as a result of these activities. We expect that transmission of Malaria and Schistosomiasis will substantially increase. Prevalence of other diseases may rise but this is not so clearly predictable.

AID has agreed to help finance the resettlement of populations displaced by the construction of the Manantali Dam, even though IDP-funded activities will have no bearing on this resettlement. The IDP will monitor the resettled population's health just as it monitors that of villages affected by irrigated perimeter construction or renovation.

Budgetary limitations prevent the IDP from funding many highly desirable health sector activities in the SRB. However, IDP funds will finance disease surveillance and control activities in villages affected by AID-funded activities as well as others. In addition, AID recognizes the need to create appropriate, comprehensive primary health care (PHC) systems throughout the SRB. Such systems are essential if those approaches to disease surveillance and control which are tested and perfected as part of the IDP/HC are to be institutionalized and financed by a combination of the involved national governments and local communities.

To see that an appropriate PHC system is installed quickly and efficiently in the SRB, the IDP will finance the salary of a health planner for two years to work with colleagues in the member state governments, regional organizations, and multilateral and bilateral donors to meet the needs of the involved states and to present the final plan to potential donors.

The master plan or "plan directeur" that they devise will form the basis for multidonor collaboration in the development of a PHC system which will require initial investments of more than $50 million.

3.5.2. Goals of the IDP/HC

The goals of the IDP/HC are twofold. In the short term, it will prevent a deterioration in the health status of the project population due to diseases aggravated by other IDP activities. In the long term, the project will contribute to an improvement in health care in the SRB by producing a master plan to elicit multidonor support for the development of a comprehensive PHC system in the SRB.

3.5.2.1. Objectives of the IDP/HC

1. Create surveillance units within the member state's Health Ministries that will use low-cost surveillance techniques to monitor selected diseases. Selected diseases include, but are not limited to, schistosomiasis, malaria, and onchocerciasis (See Appendix Table 1, Summary Disease Statement for Senegal River Valley.)

2. Train senior and mid-level technicians and field workers in the techniques of disease surveillance and control.

3. See that schistosomiasis and malaria prevalence levels are maintained at no more than 20 percent higher than those determined by baseline surveys of target populations.

4. Prevent excessive morbidity and mortality due to vectorborne or other diseases now rare in the SRB such as Yellow Fever or Rift Valley Fever which might become prevalent with the increase in different species of mosquitoes.

5. Promote improved nutritional status in the SRB by providing river basin planners with early warning signals of adverse changes in consumption patterns or anthropometric measurements resulting from increased emphasis on the consumption.

7. Convince the donor community to finance the first phase (1985-1990) of a long-term PHC system for the SRB. Partially as a result of the project's planning activities, total donor investments in the health sector in the SRB should surpass 50 Millions dollars during the period from 1983 to 1990.

3.5.2.2. Means of Verifying Objectives

3.5.2.2.1. Control of Target Diseases and Creation of Disease Surveillance Capacity

To verify that project objectives are met, personnel trained by the project and having actual field experience in the surveillance of the target diseases should be present at the national or regional level of each member state. These individuals must be assigned to national disease control units and be capable of conducting appropriate disease surveillance if member state priorities and resources require such surveillance. Three OMVS member state nationals will have been actively engaged in project activities through the OMVS or the OCCGE during five years of the project.

Another means of verifying objectives is a series of epidemiological surveys to be conducted annually in target villages during the implementation of the field work. These surveys,including Vector studies, will provide baseline information on the prevalence of target diseases and will allow the interested health authorities to follow the evolution of these diseases. The different member states will establish tolerable upper limits of prevalence of each target disease. When the limits are surpassed, the project will begin disease control activities designed to reduce disease prevalence to the acceptable levels.

3.5.2.2.2. Prevention of Excessive Morbidity and Mortality Due to Diseases "New" to the Area

The project will train health service personnel at the dispensary and the health center levels to report suspicious disease outbreaks, which will then be investigated by project staff. Verification will be achieved by means of passive disease surveillance system in use in the field centers staffed by government personnel.

3.5.2.2.3. Promotion of Improved Nutritional Status

Improved nutritional status should follow naturally from increased food production and local consumption, provided that excessive disease does not prevent proper biological utilization of those calories.

The periodic epidemiological surveys will measure food consumption and anthropometric status to enable project staff to advise policy makers on how to improve local use of increased food production. Surveillance reports indicating a declining nutritional situation, and evidence that SRB planners acted on that information to modify nutrition-related policies would be a means of verifying that the IDP/HC has contributed to an improved nutritional status of the population.

3.5.2.4. Financing of a PHC System

The IDP/HC health planner will work in close collaboration with representatives of all organizations interested in developing PHC services in the region. This group includes the CILSS and the Club du Sahel, which currently monitor donor participation by sector into the three OMVS member states. The same mechanism will be used to monitor increased donor assistance to the health sector in the SRB and to verify that the objective is achieved.

3.5.3. Outputs

A. Trained Personnel

The project will train three to six medical epidemiologists (for two years); a parasitologist, a vector control expert and a nutritionist (for one year); 15-20 nurses and laboratory technicians (for 6-12 months); and various Ministry of Health (MOH) field personnel (on an intermittent basis). The trainees will be selected among the OMVS member state nationals. Long-term training will include work in an American academic institution and/or a recognized disease control institution such as the Center for Disease Control (CDC) in Atlanta, Georgia.

B. Epidemiological Surveys

The project will conduct dry season and wet season disease prevalence and nutrition status surveys during all seasonal cycles in villages affected by IDP activities. The wet season surveys may be done twice- once early in the wet season and once shortly after the rains have stopped. Less frequent surveys will be conducted to determine food consumption patterns.

C. Epidemic Disease Investigations

All suspicious major disease outbreaks will be studied by project personnel who will then participate, with the appropriate national authorities, in the control of those outbreaks.

D. Field tested protocols for the control of schistosomiasis, malaria and other diseases, as necessary

These protocols must stress cost effective approaches that represent the least costly alternatives consistent with good public health practice.

E. A "Project Identification Document" defining a five-year project for PHC development in the SRB

By the third year of the IDP, the health planner will have prepared a document consistent with AID/W requirements for a PID and conforming to the CILSS/Club du Sahel PID format for a project to be funded by multiple donors.

F. A medium range plan for PHC development from 1990-2000

This plan will assess medium-range needs in terms of personnel, infrastructure, and other factors, providing the financial resources required to meet those needs.

3.5.4. Inputs

The three member states will pay salaries and all indemnities for the professional staff assigned part or full time to the project. The IDP/HC will finance all travel costs associated with the work of these professional personnel as well as all other project related costs. Those costs can be summarized as follows*:

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* See country specific budget for details.

3.5.4.1. Overall Budget for the IDP/HC
Amounts in Thousands of US dollars

	CATEGORY	MALI	MAURITANIA	SENEGAL	REGIONAL	TOTAL
A.	Training	170	260	150	-	580
B.	Commodities	400	565	390	30	1,385
C.	Operating Budget	130	500	200	80	910
D.	Renovation	50	10	10	-0-	70
E.	OCCGE Support	200	200	200	200	800
F.	Technical Assistance	75	75	75	745	970
G.	Contingency	75	90	75	45	285
H.	Total	1,100	1,700	1,100	1,100	5,000

3.5.5. Technical Analysis

3.5.5.1. Epidemiology of Selected Health Problems in the Senegal River Valley Basin

The Senegal River Valley Basin, embracing parts of Senegal, Mali, and Mauritania, is not a defined homogeneous region. Rainfall figures for the valley are plotted on figures A and B. Annual rainfall is very low at the coast, but increases gradually as one moves upriver. The lower basin region in both Senegal and Mauritania is very arid, almost full desert, leading just a few miles north of the valley to the Sahara Desert. As one progesses upstream, following a gradient of gradually increasing rainfall, the amount of vegetation increases, and dryland agriculture comes into view. By the time one reaches Mali, one finds gallery forests along the river in some places and considerable agriculture. Figure B illustrates the extreme seasonal nature of the scant rainfall in this region, which profoundly affects both agriculture and health. The dry lands inland from the river are known as "djeri" and are mostly grazing lands, with limited dryland agriculture possible. The land along the river, extending often from river banks for some hundreds of yards or even a kilometer or so, flat and flooded seasonally, is know as "walo" land. This land is used for crops and is very productive, if means such as irrigation can be devised to get water to it. From the bank of the river down to the water edge is a small quantity of very fertile "fonde" land, which is totally flooded during the rainy season. In the dry season, a strip of fonde up to 20 yards in width, depending on the steepness of the bank, may be intensively farmed.

Several tropical diseases are endemic to the valley, all rainfall and water-related. Figures C and D illustrate the two most important diseases, malaria and onchocerciasis. Others diseases of lesser importance are listed extensively in Table 1. Certain of these diseases may take on major importance in an epidemic situation.

The arthropod vectors of disease found in the area include several species of anopheline and culicine mosquitos and various Phlebotomus, Culicoides, and other biting flies, fleas, ticks, and snails. Table 2 presents a list of arthropod species with comments collected mostly from the lower valley. The upper valley is undoubtedly richer in number of species.

Fish culture ponds developed in villages under the IDP must be monitored carefully. Such ponds provide harbor for vector mosquitoes and snails, thus creating potentially hazardous health situations. The diseases that are potentially most hazardous are discussed below.

A. Malaria

The potential for an increased incidence of malaria as a result of dam construction and project irrigation activities poses the most obvious threat to the valley. Larvae of the anopheline mosquitoes responsible for transmission breed in standing water, which is present in areas of high rainfall, poor drainage, and irrigation. These conditions are not presently a problem in the lower valley with its low rainfall. Anopheline larvae breed in fresh water and avoid salt water. The tides come up the Senegal River for more than 100 kilometers, and the river water is brachish through much of the dry season, as are the marshes and slow side channel of the river. Anopheline mosquitoes do not favor water standing on or draining from salt laden soils such as those found in the lower river valley. Until such soil is desalinated, it si not even desirable for most plants. Thus, at present anophelines are not common in the lower valley.

Malaria is not endemic to the lower valley, up about as far as Rosso and Richart Toll. Many villages in the lower valley are quite malaria free. Progressing upstream, to Dagana, Boghe, Kaedi, Matam, and Bakel, however, malaria rates progressively become holoendemic, a situation which prevails upstream because of features of local geography and increasing rainfall. The amount of medical attention and treatment available can also influence spleen damage rates, parasitic infestation rates, and malaria morbidity rates. Although health centers chronically lack antimalarial drugs (with the frequent exception of quinine sulfate in ampoules), antimalarials are available in the local pharmacies. Table 3 summarizes available malaria data for several villages in the upper valley. Existing data are scant for the several hundred villages, yet they do permit the extrapolations outlined in Figure C. Malaria cases build up during the summer (rainy) months and peak a month or so after the rains stop.

The paradox of malaria incidence is that the most gravely ill patients often come from regions or villages with little malaria. Lacking any immunity, the infected individual responds more dramatically to a malaria attack. In the hyperendemic and holoendemic regions, the acute malaria attacks are seen only rarely, primarly in immigrants to the region. The resident inhabitants are widely exposed to malaria, often getting up to ten or more infective anopheline bites per day (one per year is all that is really needed); yet they have acquired a well-developed immunity through years of malaria exposure. An aggressive malaria control campaign aimed at reducing the numbers of infective bites or protecting the inhabitants by chemoprophylaxis might well rid a community or region (cf: WHO: the Garki Project) of its malaria, yet a serious consequence of such efforts could be loss of the populations' hard-won immunity after a lapse of just a few years.

If control efforts are relaxed, malaria will certainly reinvade the region, creating a true medical crisis. Controversy surrounds the issue of carrying out malaria control in hyper- or holoendemic regions. In hypo- and even mesoendemic areas, there is already evidence that strong forces are acting against the malaria parasite, keeping incidence of the disease down. If these forces can be identified, reinforced, and supplemented by other available techniques, a large reduction in malaria prevalence may be possible. Since the malaria rates in the population indicate that most of the population was susceptible to begin with, the dangers of a massive re-invasion are not significant.

B. Schistosomiasis

The parasite Schistosomiasis haematobium is responsible for the schistosomiasis found in the Senegal River Valley. S. mansoni is absent or rare in the lower valley and rare in the upper valley, in Mali. The disease schistosomiasis, following on S. haematobium infestation and infection, is a disease of the lower unrinary tract, bladder, and urethra. Among other manifestations of the disease is eventual cancer of the bladder. Schistosomiasis is also a water-dependent disease. First, an infected person must urinate (eggs) into standing water. These eggs hatch, and if a snail of a certain species is close by, the miracidium hatching from the egg penetrates the snails and develops and multiplies therein. The cercarial form released from the snail into the water swims about until it finds a human being immersed at least partially in the water and then penetrates this person's skin. Thus the cycle of transmission of the disease is even more intimately water associated than is the case with malaria. The cycle of man to snail and back to man does not take place in brackish water, as specific snail vectors do not multiply there.

As might be suspected, schistosomiasis is absent to rare in the lower valley, upstream at least as far as Dagana and Boghe. Foci of snails exist in a fresh water channel leading potable water into the coastal city of Saint-Louis, which is not associated with this disease, and in the town of Lampsar, near a fresh water swamp. This latter infectation was found in 1977 by a team of investigators from Yale. Surveys showed that 4,890 or 6% of the population under 20 was infected by the disease. Later studies in 1979 and in 1981 indicate that the prevalence of human infestation by the disease (46 percent in 1980) has increased markedly over several years, with no apparent change in the general status of the village and its agricultural practices. However, the SAED irrigated agriculture development scheme has been in progress in the general region over the past decade. Five other surrounding villages surveyed showed negative incidence in 1977 and have not been resurveyed since, except for hematuria studies. Kassack Sud, where there were no eggs in urine of 193 people examined in 1977, showed 33 percent (30/91) hematuria rate in 1980. A close correlation exists between

hematuria and presence of eggs in human urine. Rosso, Senegal was also shown to have a hematuria rate of 4.9 percent (19/391) in 1980.

This evidence of rapid change in the health status of inhabitants of a region where irrigated agriculture has been introduced over the past decade is an ominous sign. Schistosomiasis infestation does not appear to be well established until the level of Kaedi and Maghama, however; prevalence rates up to this point are low, and species of vector snail are rarely found. As one progresses farther upstream, prevalence rates increase, and towards Bakel, Gouraye and immediately adjacent villages, prevalence rates over 50 percent are found. Yet other nearby villages show little or no evidence of infestation. Proceeding into Mali, in upstream and regions of ever increasing rainfall, schistosomiasis prevalence rates reach very high levels; yet once again those regions are interspersed with villages with low levels. It is clear in studying the prevalence rates that caution should be exercised in characterizing the schistosomiasis situation as endemic. Transmission is dependent upon a set of local water conditions, varying from village to village, and each local situation should be studied individually. Techniques for controlling the disease should specifically be tailored and applied to the local situation in each community. In the lower valley, for example, with low prevalence rates, the degree of infection in the individual is usually minor; for instance, one of a very few eggs may appear in the urine of an infested child. The advanced disease in the upper valley remains to be seen and cannot be predicted without planned studies. The prognosis for controlling the disease in regions of low prevalence are excellent. They may also be good in regions of higher prevalence, using recently developed new chemotherapeutic agents linked with improvement in village sanitation education and health.

C. Onchocerciasis

Onchocerciasis is another water-related vector transmitted disease present in the valley. The cycle of this disease differs from that of malaria and schistosomiasis, in that the vectors in the two latter diseases--anopheline mosquitoes and snails--favor very slow moving and fresh standing water for breeding. In contrast, the *Simulium* (blackfly vector of onchocerciasis) must have flowing water, rocky rapids, current flowing past submerged or growing vegetation, and rivetted edges of stream channels, including irrigation channels. The lower river, upstream as far as Bakel, does not have stream flow characteristics acceptable to the blackfly. No onchocerciasis exists in Mauritania from the sea up to Khabou on the Mali frontier, nor in Senegal from Saint Louis to Bakel. The Faleme River joins with the Senegal River above Bakel, and for many miles forms the boundary between Senegal and Mali. The Faleme has stretches of rapid water, and onchocerciasis is found in the villages in this vicinity.

Upstream through Mali, the disease becomes increasingly evident. At the level of Kayes it is hypoendemic, but a few kilometers upstream from Kayes are several recognized foci of infection, and from Bafoulabe-Mahina, where the Bafue River and the Bafing River join to form the Senegal River, high prevalence rates are evident (see Figure E). While these rates are associated to some degree with rainfall (no water, no blackfly, no disease), they are also linked more closely to geographic factors. The valley changes from a very flat topography with increasing altitudes getting into the hills, where streams become mountain rivers of rapid flow much favored by the blackfly.

The prevalence rates vary widely from village to village depending upon the local topography and distance of the village from flowing water. Blackfly larvae living in the fast flowing water are usually controlled by insecticides, sometimes aided by useful sanitary engineering components. Each local situation requires special study. The WHO Onchocerciasis Control Program (OCP), based in Upper Volta, is considering a control program for the upper Senegal and other river basins, pending donor support. Bites from the blackfly will also pose a serious menace to dam construction workers. However, onchocerciasis control will not be undertaken in the context of this project for three reasons: (1) the only effective approach--larvaciding breeding sites--is too expensive, (2) project activities will tend to reduce transmission of the disease by reducing the number of breeding sites; only under very special conditions would OMVS-financed activities tend to create breeding sites for the blackfly, such as the dam spilling and stretches of the river just below the dam, and (3) other sources of financing for onchocerciasis control are likely, as mentioned above.

D. Dracontiasis

Dracontiasis (Guinea worm) is spread to humans through infected Cylops crustaceans ingested in the drinking water. The human being infested with this yards-long helminth continues the cycle by wading, usually in the water, often at the village watering hole. The worm in the human awaits such an opportunity and deposits or squirts out hundreds of eggs into the water. The eggs hatch and people become infested by drinking the water containing the infected Cyclops. Little or no dracontiasis presently exists in the village along the Senegal River in both Mauritania and Senegal. As one goes inland from the river to villages 20 or 30 kilometers from a major water source, prevalence rates in the villages located in the djeri or inland desert may be high. The villages around Selibaby, 80 kilometers inland from the river, are known to be infested. The World Bank financed an epidemiological study which was carried out by the School of Medicine of Mali in the Kayes Region. This study demonstrates that up to 23 percent of

the population is infested annually and loses an average of 54 work days. If this disease is found to be prevalent in the villages affected by AID-financed intervention, the IDP/HC will undertake control efforts.

Table 1 presents a list of other diseases prevalent or occasional in the valley, with marginal comments. Certain of these diseases--cholera, meningitis, measles, influenza--are known to cause epidemics in the region. Others are endemic infection, of great importance. The diseases, with the exception of the dysenteries and diarrheas, are not usually related.

In addition to the aforementioned measures, the attached "WHO-Matrix for the Study and Assessment of Impacts Resulting from Environmental Management for Vector Control" will also be used as an instrument of the IDP/HC.

E. Other Diseases

Other diseases spread by mosquito vectors but currently not problematic in the SRB may rise with the expected increase in the mosquito population. Two such diseases are Yellow Fever and Rift Valley Fever. Due to a combination of active immunization programs and relatively infavorable habitat for the vector *Aedes aegypti* mosquito, no serious outbreaks of yellow fever have been recorded in the SRB in the last few years, although isolated cases or small epidemic foci were reported from Senegalese communities outside the river basin in 1981. A major epidemic resulting in hundreds of deaths occured in the Gambia in 1978. These two incidents attest to the lethal nature of this disease. Although the SRB has reported no clinical cases of Rift Valley Fever (RVF), serological studies at Yale University of blood specimens drawn from individuals in the river basin demonstrated antibody to RVF. A recent outbreak of RVF in Egypt, resulted in hundreds of deaths and the loss of thousands of head of cattle. The potential seriousness of this disease must not be under estimated. IDP/HC field workers will encourage health workers in the SRB normally responsible for passive disease surveillance to be particularly vigilant in their search for cases of such a disease. Should suspect cases be found, the staff of the IDP/HC will actively participate in the disease investigation and control activities.

F. Sexually Transmitted Diseases

A new town of more than five thousand construction workers, many imported without their families, will grow up around the dam site near Manantali, creating an ideal social situation for the spread of sexually transmitted diseases. The IDP/HC staff will advise those health workers responsible for the health of the construction workers on the surveillance and control of these diseases, specially syphillis and gonorrhea.

G. Environmental Pollution Due to Use of Agrochemicals

The irrigated agriculture program financed by the IDP will require the use of chemical fertilizers and perhaps pesticides that may contaminate the water and food supply or, in the case of the pesticides, directly poison farmers who use them. Proper use of these potent chemicals will be the responsibility of the agricultural extension workers in project villages. The IDP/HC staff will train local health workers as well as agricultural extension agents in the techniques for monitoring chemical residue in the food and water supply and in the proper handling of these chemicals to minimize the possibility of environmental contamination. If farmers or extension agents use significant amounts of organophosphate pesticides, project personnel will instruct the local health workers in the use of simple techniques to monitor cholinesterase in people who have particularly intense exposure to these very toxic chemicals.

3.5.5.2. The IDP (Integrated Development Program and Health)

The IDP is certain to have adverse effects upon water-related diseases . The vectors and intermediate hosts of these diseases depend on standing water for the development of larvae (mosquitoes) or for the complete life cycle (snails).

The low dam at the downriver site at Diama will flood some land and will provide shoreline habitat for mosquito breeding and for small harborage. Since this dam will prevent sea water from moving up the sluggish Senegal River in dry season (over 100 kms.), the lake itself will be only minimally brackish (from salts leaked out of the saltladen soils) and the margins will have water characteristics capable of supporting mosquitoes and snails. In addition, the soils of the land irrigated by these waters will be progressively desalinated (this process may take decades), and marshes near St. Louis, Ross-Bethio, Lake Rkis, and the irrigated fields along the river could eventually support heavy mosquito breeding and snail production. A considerable increase in malaria from present low levels in the lower river basin can be anticipated. Further upriver, above the level of tidal influence, the impact will be less evident since higher endemic levels for both malaria and schistosomiasis already exist.

The Manantali dam poses a different set of health problems. The impoundment itself--in a thinly populated region with malaria, schistosomiasis, and onchocerciasis endemic--will flood a stretch of river that produces blackflies (the vectors of onchocerciasis). While the hatching sites will thus be eliminated from the impoundment area itself, malaria and schistosomiasis will be moved from the river edge to the lake edge. Downstream from the dam, it is proposed to maintain controlled flow of water throughout the year. Rainy season floods will

be partially controlled. There will be a dry season flow adequate to provide irrigation waters throughout the year. Mosquito and snail production will be both increased and extended into year round vector production. Regions with hypo-, meso-, and the lower fringes of hyperendemic malaria will feel the impact as malaria transmission becomes more intense. The hyperendemic areas will hardly feel any impact since they are widely exposed already. Existing evidence (vide supra) suggests a considerable increase in schistosomiasis.

3.5.5.3. The Nutritional Situation in the Senegal River Basin (SRB)

By any standards, the nutritional status of the population of the SRB is deplorable. The recent (1981) epidemological study undertaken as part of the design of the Health Development Project (PDS) to be funded by the World Bank in the Kayes region of Mali showed that:

- 71.1 percent of children have a weight inferior to 80 percent of the Harvard standard for their age.
- 34.7 percent of children have a weight inferior to 80 percent of the standard for their height.
- 35.8 percent have a height inferior to 90 percent of the standard for their age.

Using the Waterlow classification for these data, one finds that below age one, 28.2 percent of children are malnourished. This malnutrition is almost exclusively (93 percent) acute. Between age one and age five, 51.8 percent of children were malnourished; that chronic malnutrition was slightly more frequent than acute malnutrition (54.5 percent vs. 45.5 percent).

Nutritional information about the SRB population in Senegal and in Mauritania after the great drought is incomplete. The fact that 25.4 percent of all children ever born in the Fleuve region of Senegal die before their sixth birthday indicates a significant malnutrition problem complicated by the infections diseases in the region.

Food production increases in the SRB should lead to increased food consumption and improved nutritional status for the population. No improvement will occur, however, if the population sells the excess food produced to buy consumer goods. The IDP/HC technicians cannot dictate how people should profit from the increased food production or revenues generated by it. It is their obligation, however, to provide river basin policy makers with the information they need to evaluate the impact of the IDP/HC on the nutritional status of the population. These policy makers will then decide whether or not educational campaigns intended to influence people's food consumption patterns are warranted.

To provide a base of information on nutritional status, technicians should measure the weight, age, and perhaps the arm circumference of a sample of children under age three in the target villages. This anthropometry will be accomplished at the same time as the schistosomiasis and malaria surveys. Food consumption surveys will be conducted three times during the life of the project. The methodology will be determined by consultants from the OCCGE regional nutrition research institute in Dakar (ORANA) acting in concert with the three national nutrition services involved.

3.5.5.4. Epidemiologic Surveillance

Project trained personnel will conduct periodic (twice or three times yearly) surveys for five years in the target villages designed to produce age-specific prevalence rates for malaria and schistosomiasis and to determine the anthropometric status of children under age three.

The surveys will be conducted by mobile teams varying in terms of their institutional base from country to country. The project staff will make every possible effort to coordinate methodologies; given varying conditions and philosophies, however, such coordination may be difficult. In any case, questions regarding technical approach will be resolved during periodic meetings of the IDP/HC Technical Review Committee. This committee would decide issues such as: (1) the nature of the population sampling technique to be used for each disease, (2) whether or not to assess spleen damage as well as parasitemia levels as a measure of the importance of malaria, (3) whether to include hematuria as an indicator of schistosomiasis hematobium infection or to rely exclusively on egg counts in the urine, and (4) whether or not to include arm circumference as an anthropemetric measure.

The guiding principle for the choice of technical approaches will be that the method is relatively simple and inexpensive as well as reliable. Sophisticated laboratory techniques will be employed very sparingly, to resolve specific questions arising in the course of the field work rather than to routinely follow the evolution of a disease process in the target village. If, for example, an outbreak linked to a highly dangerous arbovirus were to occur, and if relatively sophisticated serologic and immunofluorescent antibody techniques as well as expensive safety precautions were necessary to protect investigators, project funds could be used to finance appropriate studies at the Pasteur Institute in Dakar, the only local laboratory equipped to process such dangerous agents.

Vector studies will be conducted during the wet and dry seasons on three occasions during the project. Studies of the malaria vector should include careful mapping of breeding sites, detailing of the mosquito species present, their infection rates, and their biting habits. Snail studies will include species identification, infection rates, density, and distribution. Studies of the onchocerciasis vector, Simulium damnosum, will be conducted only in areas not affected by the "mini-program" described below, and only then in areas highly suspected of being good breeding sites, i.e., areas of fast moving, highly oxygenated water.

3.5.5.5. Disease Control Activities

The IDP/HC will attempt to control schistosomiasis and malaria in those villages affected by AID-financed activities. As with the technical methods to be used to conduct surveillance, the Technical Review Committee will make decisions as to what combination of chemical vector control, environmental alteration, chemoprophylaxis, or chemotherapy will be used. Only after baseline surveys have been completed and some information concerning the epidemiology of each disease is available will the committee decide which strategy to use in each village.

As noted, even in areas highly endemic of schistosomiasis, the epidemiology varies considerably from village to village such that a village with essentially no infected people may be adjacent to a village with prevalence rates of 70 to 80 percent. One of the objectives of the project will be to train health workers to discover why transmission occurs in one village and not the other and to encourage inhabitants of infected villages to modify their behavior or environment so it more nearly resembles that of their uninfected neighbors. Only after these less expensive approaches to the control of schistosomiasis have been considered will recourse be made to more expensive and potentially harmful approaches such as molluscacides or mass chemotherapy. The project will make all efforts not to use molluscacides. If they prove to be necessary, an environmental assessment of their benefits and risks will be conducted.

The German Government has financed extensive trials of a German-made drug, Praziguantrel, in the Mopti region of Mali. These trials have proven the drug to be highly effective in curing infected individuals with a one-dose regimen and have proven that the drug is relatively nontoxic. Periodic treatment of entire villages or only of highly infected individuals--depending on the epidemiology of the disease in a given village--will produce long-lasting reductions in the transmission of the disease. The present problem with Praziguantrel is that it is very expensive.

Disease control activities will not begin until early in the third year of the project. At this time, project personnel will determine what combination of technologies should be employed against schistosomiasis in those villages found to be heavily infected during the baseline survey.

Controlling and minimizing the effect of malaria in rural Africa is an extremely difficult undertaking and the subject of considerable controversy. As mentioned earlier, inappropriate, expensive, or impractical strategies that cannot be maintained by a country's health budget after external funding has terminated, may only serve to interrupt transmission long enough for a population to lose its naturally acquired immunity. The most vulnerable member of that community will then face much greater risk from the infection that will inevitably follow the cessation of control strategies.

Inappropriate control strategies may hasten the appearance of drug resistant strains of malaria such as is now the case in Tanzania. Chloroquine resistant malaria well entrenched in the Senegal River Basin would be an economic as well as a social and public health disaster.

In view of these concerns, very careful consideration will be given to the epidemiology of malaria in a given village, as well as to the available mix of control modalities, before a final choice is made. Obviously, the project will place as much emphasis as possible on inexpensive manipulation of the physical environment to reduce breeding sites. In villages practicing irrigated agriculture, this method is unlikely to be effective, however. As the state of the art of malaria control existed at the time of writing, chemical control of the vector by larvaciding or by spraying households was unaffordable in rural areas of the SRB. The role of chloroquine prophylaxis during the rainy season for high-risk individuals such as young children and pregnant women is much more controversial.

Chloroquine prophylaxis is the official policy of two of the three OMVS member states. Prophylactic chloroquinization of high-risk individuals is currently practiced in USAID/Senegal financed projects.

Those responsible for the World Bank financed project in Mali are considering such a strategy.

3.5.6. Training

Training health workers to survey and control certain diseases is one of the most important objectives of the IDP/HC. While this training will vary markedly from country to country, in all three member states health workers at three levels will receive practical field-oriented training.

A) The three classes of personnel to be trained are (1) two physicians from each country who will serve as natural technical directors (2) nurses, and, in some cases, laboratory technicians who will serve as the leaders of the field teams. There are nurses who are normally assigned to the health centers responsible for project villages, and (3) dispensary level nurses and community health workers where they exist.

Senior technicians, usually physicians who are potentially "policy makers", will receive long-term training in the U.S.before assuming functions as directors of field activities for the IDP/HC in their respective countries or as technicians at the OCCGE or at the OMVS High Commission.

Although the need to master English to study in the U.S. will prolong the training period, the future usefulness of English fluency justifies the investment of time. For young health professionals truly devoted to a career in the surveillance and control of tropical diseases in Africa, the ability to read English is extremely valuable.The Center for Disease Control, a part of the U.S. Department of Health and Human Services, has developed a unique, world renowned approach to the training of epidemiologists. The IDP/HC hopes to take advantage of this value U.S. resource. A number of American schools of Public Health, including Tulane, Yale, Harvard, and Johns Hopkins, have had considerable experience in developing country health programs and have strong departments of epidemiology. The project will make every effort to exploit those resources as well.

Mid-level technicians -- nurse supervisors and laboratory technicians -- will be trained at the various OCCGE Research Centers or by the Faculty of Medicine in Dakar. They will then be assigned to health centers of other health units from which they will supervise the actual field work to be conducted as part of the IDP/HC. Finally, nurses and other para-medical professionals working in dispensaries or at the village level will be trained in the field to actually execute project disease surveillance and control activities.

B) Dispensary nurses and community health workers will participate fully in project activities. The present will attempt to define an ongoing surveillance methodology which will almost completely be implemented by this level personnel after project activities cease.

The IDP/HC will encourage officials from the health worker training institutions in the three countries to allow their students to participate in conducting surveys and control efforts. The project will finance the necessary per diems to allow that participation.

Detailed descriptions of the OMVS, Senegal, Mauritania and Mali programs appear in separate sections of this paper.

3.5.7. Implementation Plan

A. Year One - Pre-Implementation Activities

1. Year one will be devoted to establishing the regional support unit of OMVS, initiating the health planning activities, and selecting candidates to begin long-term training. There will be two meetings of officials from the three member-states and other interested organizations. The first meeting to be held in the second project quarter will be a meeting of the technical review committee to establish criteria for selecting candidates for long-term training and to begin discussions to adapt surveillance strategies acceptable to all three member states. Following this meeting, short-term consultants including an epidemiologist, a malacologist, and entomologist, will visit each member state to finalize the strategy, which will be adopted by the end of the first year.

2. Ten vehicles will be purchased for project use and laboratory equipment, medicines will be provided.

3. The candidates selected for U.S. training will begin English training during the 3rd and 4th project quarters.

4. The planning committee will meet during the first year to define the process that will be used to develop the PID and the master plan for the PHC system. Following the first meeting, the committee will work in the field along with short-term consultants in manpower development, training and health economists to prepare a first draft of the PID and master plan.

B. Year Two - Planning Activities

1. During the fifth project quarter, the second meeting of the planning committee will be held to review the first draft of the PID and master plan. Based on guidance received during this meeting, the health planner will revise those documents and present the revised versions to the third meeting of the planning committee, to be held during the seventh project quarter.

2. During the seventh project quarter the PID will be presented to the interested donors through the OMVS Consultative Committe. A pledging meeting will be held midway through the eighth project quarter. The final meeting of the planning committee, to be held during the eighth project quarter will define the collaborative planning process following the departure of the health planner.

3. The epidemiologist and assistant project manager will arrive early in the fifth quarter of the project. The first round of disease prevalence surveys will be conducted in the last half of the second project year. The parasitologist, vector control expert, and nutritionist will return from the U.S. in the seventh or eighth project quarter to assume their positions with the OCCGE or the OMVS/Member States

4. The first vector studies will be conducted in the end of the second project year.

C. Years Three to Six - Implementation

1. Prevalence studies will continue at the rate of two or three per year.

2. The first IDP/HC evaluation will be conducted at the end of year three of the project.

3. The technical review committee will consider the evaluation findings, revising surveillance strategies accordingly.

4. Disease control interventions will begin early in the third year based on an analysis of the baseline surveys. Future survey results will measure the success of these initial disease control efforts.

5. During year three, the initial funding for the PHC service delivery system will be obtained.

6. Initial assessments of the impact of agrochemicals on land, water, and human health will be conducted. If pesticides are being used, training programs will be organized to train agricultural extension agents in proper handling.

7. The project will be evaluated after these years and again at the end of the project's sixth year.

D. Year Seven - Control Activities

1. The Epidemiologist will prepare a final analysis of the surveys and results of the disease control efforts.

2. A final meeting of the TRC will study all the available documentations and make recommendations on how similar activities can continue with or without AID financing.

3. Note: Consult Tables 6-10 (Appendix B) for a detailed view of the implementation activities by project quarter.

E. Responsibility for Project Implementation

For the OMVS/HC to have a long lasting impact on the health of people in the SRB, surveillance and disease control systems appropriate to ecologic, epidemiologic and resource constraints particular to the SRB must be identified. Although each OMVS member state has somewhat unique problems and resources in its part of the basin the similarities are much more important than the differences. Thus sharing information among the three countries and an attempt to harmonize the health policies of the three states become important objectives of the OMVS/HC.

The following sections describe in some detail the various levels of authority in the three states and the proposed coordinating mechanism.

1) Responsibility for field work

Nurses and, in some case, laboratory technicians stationed in field stations located in Health Centers will be responsible for the actual collection of epidemiologic information in the field and the diverse control efforts which will follow. These field stations will be in Mali at Mahina/Bafoulabé, in Senegal at Bakel, and in Mauritania at Kaedi and Selibaby. Those nurses directly responsible for the field work will involve to the maximum extent possible the more periferial ministry of health personnel located in the dispensaries and in villages where community health teams exist. These health center personnel who are directly responsible for the field work will be supervised by the technical director of project activities who will be located in Nouakchott, Dakar and Mahina/Bafoulabé.

2) Natural Technical Director

The project will train two physicians from each member state in the applied epidemiology and control of the target diseases. These individuals will then serve-alternatively, not at the same time - as national technical directors for project activities. While one physician is in training status the other will serve as program director. In Mali, the Natural Technical Director will be a staff member of the National Institute for Public Health (INRSP) but will be assigned to the training center in Mahina/Bafoulabe. In Mauritania the National Technical Director will be assigned to the Centre National d'Hygiène and will be responsible directly to the center director.

In Senegal, the National Technical Director will be assigned to the parasite disease control unit in the Ministry of Health which is part of the Direction of Hygiène and Health Promotion (DHPS).

3) The Technical Committee

a) Project Review

Every six months each National Technical Director and his superior in his Ministry of Health will meet in one of the national capitols

to review the results of the past six months activity and to agree on a plan of action for the next six months. The epidemiologist and the core project staff assigned to the OMVS Secretariate will prepare these semi-annual review meetings. Decision making authority will rest with the three senior representatives of the different Ministries of Health. Decisions concerning project activities will be binding on those technicians charged with project implementation as long as they are compatible with the objectives of the project and the administrative regulations of OMVS and AID. Attending as observers at each technical review meeting will be the three scientists assigned to OCCCGE, a representative of OMVS, WHO, UNICEF, USAID and any other interested bilateral donor.

b) Information exchange (See Table 8)

One of the principal objectives of the semi-annual project review will be to make summary information from all the natural activities available to the different technical directors who can in turn make it available to their field staffs. This process will assure the widest diffusion of information about field activities.

4) Coordination of Technical Assistance Impact

This will be the responsibility of the epidemiologist assigned to the OMVS Secretariate. As a result of decisions taken by the technical review committee, the epidemiologist will prepare six month work plans which will detail the kinds of technical assistance which will be necessary. Such technical assistance will first be sought within the involved country, then through the OCCGE and as a last resort through the US institution which wins the contract to provide short term technical assistance. As is specified elsewhere,the three OCCCGE Scientists will spend 75% of their time working on project activities. The vast majority of that time will be spent advising the field teams as they actually do disease surveillance and control. (See Table 7).

3.5.8. Terms of Reference for Long-Term Technical Assistance to be provided through the IDP to the OMVS and Member States

3.5.8.1. Medical Epidemiologist - Technical Director of the IDP/HC

A. Objective

Provide overall technical direction to the project and serve as the senior technical consultant to USAID and the OMVS on all aspects of the health component.

B. Scope of work

1. Supervise the provision of all technical assistance.

2. Provide technical advice to the Member State Governments, the OMVS, and the various USAID's concerning project activities and the epidemiology of infectious diseases in general.

3. Represent the project to all U.S., African, and international health organizations such as the World Health Organization .

4. Monitor the technical performance of all contractors hired to provide short-term technical assistance of training.

C. Qualifications

1. Training - The epidemiologist should be a physician, preferably with a masters degree or equivalent in epidemiology. An individual with no clinical training but with a masters of science degree in epidemiology and appropriate African experience will be considered.

2. Experience - A minimum of three years of experience as a public health expert in a developing country.Strong preference will be given to candidates with African or even better, Sahelian experience. Experience with infectious disease control programs such as the Expanded Program for Immunization (EPI),malaria, or other vector disease control programs is highly desirable.

3. Language - FSI 3/3 is the absolute minimum requirement; an FSI 3 in spoken French preferable.

4. Other - Proven ability to work constructively with senior African health planners is extemely important for this individual, who will negotiate regularly with senior officials from three national governments and at least two major regional/international organizations.

D. Conditions of Employment

This individual will be recruited from the ranks of Direct Hire AID employees or on a PASA from an organization such as the Center for Disease Control. He or she will not be paid from project funds. The candidate will be assigned to the Development Directorate of OMVS.

3.5.8.2. Assistant Project Manager

A. Objective

To assume primary responsibility for all aspects of the project not involving technical issues or major policy issues. Policy issues will be determined by the IDP regional project manager, in conjunction with Mission Directors.

B. Scope of Work

1. Assure that fiscal management conforms to AID requirements.

2. Prepare a six-month work plan for each country component approved by the proper USAID and MOH official. These work plans should be accompanied by appropriate budgets.

3. Supervise the work of the administrative assistant and the secretary as well as the nontechnical aspects of the work of project consultants.

4. Assure day-to-day liaison with the chiefs of the relevant USAID/Senegal offices, such as the Controller's Office and/or the Management Office.

5. Maintain liaison with other IDP Technical Assistance personnel to assure that the health component complements the other project elements.

6. Train the administrative assistant to assume the tasks of assistant project manager.

C. Qualifications

1. Training - Masters degree in public health or a management related discipline.

2. Experience - A minimum of three years of work in a Francophone African country as a public health or management

consultant. Strong management experience will be more important than public health experience. Preference will be given to candidates with previous experience in a Sahelian country.

D. Conditions of Employment

This individual will be recruited from the ranks of direct hire AID employees or on a PASA from an organization such as the CDC in Atlanta. He or she will not be paid from project funds. The candidate will be assigned to the Public Health Unit of the OMVS Directorate of Development and Coordination.

3.5.8.3. Statement of Work - Health Planner

A. Objective

To define and encourage use of a planning process for the development of a PHC system in the SRB that will involve senior health planners from all three member states and representatives from international organizations and donor agencies sharing an interest in SRB development.

B. Scope of Work

1. Make an initial inventory of existing health personnel resources infrastructure and current national plans to improve the PHC system in the SRB.

2. Organize a series of four semi-annual working group meetings of the individuals cited in the objective paragraph. The purpose of these working groups will be to guide the work of the health planner to be secunded to the OMVS High Commission.

3. Establish, in collaboration with the working group, a series of practical attainable goals for the types of different health services to be available in the SRB by year 2000. These goals should involve estimates of personnel training requirements, construction and logistical support, and pharmaceutical requirements, as well as estimates of necessary financial resources.

4. Prepare a Project Identification Document meeting the criteria set for in the CILSS/Club du Sahel guidelines for such documents, for a five-year project (1985-1990) to be the first phase of the PHC system development described in paragraph 3 above. This project, developed in close collaboration with the working group, should appeal to a wide assortment of potential donors and be completely funded by December 1985.

C. Qualifications

1. Training - A masters degree or its equivalent in a discipline related to the planning of public health and social services.

2. Experience - A minimum of five years of experience working as a health planner. Preference will be given to individuals with previous work experience in a Sahelian country.

3. Language - The individual must have a FSI 3/3 in French.

D. Conditions of Employment

This individual will be hired through a personal services contract and assigned to the public health unit of the OMVS Directorate of Development and Coordination.

3.5.8.4. Statement of Work - Administrative Assistant

A. Objective

To facilitate the work of the IDP/HC epidemiologist, health planner, and management officer.

B. Scope of Work

1. Assume primary responsibility for all liaison with the USAID/SMO to assure prompt processing of all commodity-related document and procedures such as PIO/C, waivers and tax exemptions.

2. Assume primary responsibility for making all travel arrangement for anyone traveling on IDP/HC business.

3. Provide necessary support to all persons transiting or working in Dakar on IDP/HC business; arrange hotel room, secretarial and in-town transport as necessary.

4. Process all vouchers through the USAID/ Regional Controllers Office.

5. Organize meetings in Dakar concerning IDP/HC business.

6. Perform all other necessary tasks to expedite the work of the other team members.

C. Qualifications

1. Training - Baccalaureat or (High School) equivalent degree.

2. Experience - Previous experience with ordering materials and clearing through Senegalese customs is desirable.

3. Conditions of Employment

This individual will be recruited locally and hired under a personal services contract. He or she will be assigned with the Health Planner and the Epidemiologist to OMVS AHU of the DDC.

3.5.8.5. Statement of Work - Parasitologist

A. Objective

To provide initial training and subsequent supervision in the field to the staff of the IDP/HC relative to the surveillance and control of parasitic diseases.

B. Scope of Work

1. Train IDP/HC field staff to correctly diagnose parasitic diseases using available technologies.

2. Organize the project's disease control programs.

3. Provide short-term analysis of project personnel's performance in the field and propose retraining programs.

4. Conduct independent research appropriate to schistosomiasis and malaria control. This activity, to be approved by the OCCGE Director, should not require more than 25 percent of the person's time.

C. Qualifications

1. Training - Physician or PH.D in Parasitology.

2. Experience - A minimum of five years of practical experience working on the control of infectious diseases in Africa.

3. Nationality - The candidate should be a citizen of one of the OMVS member states. If no qualified candidates are available, a citizen of another OCCGE member state will be considered.

4. Language - The candidate should have at least a minimal familiarity with the English language to permit him or her to follow an intensive English course for three months. After this intensive training, the individual must speak English well enough to participate actively in a nine to twelve month intensive training program in the U.S.

D. Conditions of Employment

1. This individual will be trained in the United States for a period of twelve to fifteen months.

2. Following training, the candidate will be assigned to the OCCGE or the OMVS secretariat.

3. All salary and personnel benefits will be negotiated between the individual and the contractor organization. All future administrative support and supervision of the parasitologist will be the responsibility of the contractor.

4. The organization employing the parasitologist will be reimbursed by the IDP/HC for the individual's salary and associated expenses, solely during the life of the project.

3.5.8.6. Statement of Work - Vector Control Expert

A. Objective

To provide initial training and subsequent supervision in the field to the staff of the IDP/HC relative to the conduct of entomologic surveys and to the control of mosquito and snail vectors.

B. Scope of Work

1. Train the IDP field staff to identify various stages of different species of vectors and determine vector densities and vector infection rates.

2. Describe vector breeding sites in the project and other issues relative to vector propagation that affect disease transmission.

3. Advise project staff on feasibility of attempting vector control in the project area.

4. Supervise the work of the field teams charged with executing the vector studies, and implementing control programs.

5. Conduct independent research. This activity will consume less than 25 percent of the individual's time.

C. Qualifications

1. Training - A minimum of a university degree in one of the biological sciences . A degree in entomology is preferable.

2. Experience - A minimum of five years of experience working in vector or pest control.

3. Nationality - This individual should be a citizen of one of the OMVS member states. If no qualified candidates are available, a citizen of another OCCGE member state will be considered.

4. Language - The individual should have at least a minimal familiarity with English to permit him or her to follow an intensive English course for three months. After this intensive training, the individual must speak English well enough to participate actively in a nine to twelve month intensive program in the U.S.

D. Conditions of Employment

1. This individual will be trained in U.S. for a period of twelve to fifteen months.

2. Following training the individual will be assigned to the OCCGE or the OMVS.

3. All salary and personnel benefits will be negotiated between the individual and the contracting organization. All future administrative support and supervision of the parasitologist will be the responsibility of the contracting agency.

E. Conditions of Employment

This individual will be hired through a personal services contract and assigned to the Health Office in USAID/Senegal.

3.5.8.7. Statement of Work - Nutritionist

A. Objective

To provide initial training and subsequent supervision in the field to the staff of the IDP in conducting nutrition surveillance and food consumption surveys.

B. Scope of Work

1. Train IDP/HC field to accurately weigh and measure young children and assess their age.

2. Train IDP/HC staff in the methodology for choosing population samples to be studied.

3. Supervise the IDP/HC field staff in the conduct of anthropometric surveys and food consumption surveys.

4. Assist member state nutrition services in analyzing survey data.

5. Conduct independent nutrition research in the SRB. This activity should not occupy more than 25 percent of the individual's work time.

C. Qualifications

1. Training - A minimum of university degree with a nutrition-related specialization.

2. Experience - A minimum of five years experience with nutrition programs in an OCCGE member state.

3. Nationality - This individual should be a citizen of one of the OMVS member states. If no qualified candidates are available, citizens of another OCCGE member state will be considered.

4. Language - The individual should have at least a minimal familiarity with English to permit him or her to follow an intensive English course for three months. After this intensive training, the individual must speak English well enough to participate actively in a nine to twelve month intensive training program in the U.S.

D. Conditions of Employment

1. This individual will be trained in the U.S. for a period of twelve to fifteen months.

2. Following training the individual will be assigned to the OCCGE or the OMVS.

3. All salary and personnel benefits will be negotiated between the individual and the organization . All future administrative support and supervision of the parasitologist will be the responsibility of the employing agency.

4. The organization employing the parasitologist will be reimbursed by the IDP/HC for the individual's salary and associated expenses.

3.5.9. Description of Country Specific Programs

3.5.9.1. The OMVS Regional Support Unit (RSU)

A Regional Support Unit will be created to provide administrative, technical, and logistical coordination for the project from the OMVS High Commission. The Regional Support Unit (RSU) will have three separate functions: (1) provide continuous management and administrative support to the field activities, (2) provide technical review, advice, quality control, and other support to disease surveillance and control personnel in the field, and (3) prepare a master plan for the short and medium-term development of a primary health care delivery system for the river basin area of all three countries to respond to the peculiar problems common to that ecosystem.

Management and Administration

The RSU will be responsible for coordinating project implementation in the three member states. A member state health component director in each state will report to the proper national health authorities.

In each of the involved USAID's, someone will be designated to assure that project implementation is consistent with the USAID's and the host governments' basic policies concerning financial management and all other aspects of project development. In Senegal, the assistant project manager hired by the IDP/HC will assume this monitoring role. In Mali and Mauritania a USAID employee with other tasks will be responsible for the health component. Monitoring the health component should not require more than 8-10 hours per week.

Epidemiologist

During the period when surveillance activities are ongoing, from months 12 to 84, the RSU will be headed by a physician/epidemiologist with extensive field experience in Francophone West Africa. This person should understand the art of getting along, and of getting things done, as well as the epidemiology of the diseases. During the first 12 months of the IDP, the RSU will be headed by the health planner, whose role is described below.

Administrative Assistant

During the entire seven years of the IDP there will be a fulltime, locally-hired administrative assistant responsible to the director of the RSU. This person will be responsible for all issues related to commodity procurement, logistical support, and other administrative support tasks, such as preparing PIO/P's and organizing conferences.

The administrative assistant will rely heavily on USAID offices such as the SMO (Support Management Office) and the Management Office, as well as on appropriate offices at the OMVS for support and guidance.

Assistant Project Manager

The epidemiologist director will be assisted by a health systems management expert charged with six principal tasks: (1) to continue to focus the attention of health planners from the member states and representatives of donor organizations on the need to develop the basic health infrastructure of the river basin; (this work will obviously be a follow-up to that begun by the health planner), (2) to assure that careful budgetary planning is practiced and that project fiscal policies are reasonable and consistent with USAID and host country regulations, (3) to facilitate the monitoring function of the three USAID's, (4) to maintain constant liaison with other IDP staff to assure that the planning, implementation, and evaluation of the health component is in phase with, and complementary to, that of the other components, (5) to teach financial planning and management skills to the technical staff, (6) to act as an assistant to the overall IDP project manager in all aspects of project direction, and (7) to train a citizen from the OMVS member state to assume the functions of the Assistant Project Manager when he terminates his three year contract.

Health Planner

During the first year of the IDP, before surveillance and control activities can begin in the field, a full-time health planner will work with the planning units of the three member states to develop the master plan referred to above. This plan will detail a process through which, with generous and prolonged donor commitment, the three states will be able to develop delivery systems making most elementary health services reasonably accessible to the majority of the population. The exact nature of those services will depend on national PHC strategies, available resources, and the nature of the constraints, which are not identical in all three countries.

After two years, the health planner will have: (1) prepared a detailed analysis of existing and planned physical infrastructure and personnel development in the SRB; (2) established a working group of representatives of the three member states and interested regional and international organizations, which will have met on at least three occasions to attempt to harmonize health sector development strategies for the river basin. These will include policies on such issues as payment for drugs and services, local management of peripheral health units, accessibility to different levels of care, and remuneration of different professional and non-professional health personnel (the working group will be organized by the OMVS); (3) proposed a <u>process</u>

through which a multi-donor consortium will mobilize adequate investment capital to lay the basis for what is to become a self-sustaining health system financed by the users; this system will be designed in collaboration with the working group, and (4) described, for the SRB meeting AID/W's and the CILSS's requirements for a Project Identification Document, and appearing amenable to multi-donor financing.

The epidemiologist, health planner, administrative assistant, and secretary will be assigned to the OMVS, where they will be supervised by a permanent OMVS official. The assistant project manager will be assigned to the regional health office in USAID/Senegal where he/she will be supervised directly by the health officer.

During his/her three years with the project, the expatriate assistant project manager will train the administrative assistant to assume his/her task during the last three years of the project. A replacement for the original administrative assistant will then be assigned to the OMVS.

3.5.9.2. The Senegalese Component

A. Introduction

The USAID and the Government of Senegal (GOS) have collaborated fruitfully in the Senegal River Basin in Bakel as well as in the Casamance to effect surveillance of schistosomiasis, malaria, and other diseases. This surveillance has been conducted by teams from the Service pour la Lutte Anti-Paludique (SLAP) and from the Department of Parasitology at the University of Dakar. USAID has been particularly satisfied with the quality of this work, and anticipated continuing the ongoing relationship with SLAP to actually conduct the disease surveillance and control activities in the context of this project.

B. Goal and Purposes

The goal of this project is to help the GOS prevent a deterioration in human health in the Senegal River Valley due to an increase in the prevalence of malaria, schistosomiasis, and other health problems that could accompany the increased use of irrigated farming practices. Because AID believes that increases in agricultural production should be accompanied by improvements in the nutritional status of the population, it will also monitor the latter.

The project purposes are: (1) to improve Senegal's disease surveillance and control capacity through the long-term training of medical epidemiologists, nurses, and laboratory technicians; (2) to monitor, through periodic epidemiologic surveys, the prevalence of malaria, schistosomiasis, malnutrition, and other diseases in the

villages of the department of Bakel and around the town of Podor where the IDP will finance the construction or renovation of irrigated perimeters; and (3) to evaluate the effectiveness of various approaches to control the above diseases.

C. Inputs Necessary to Achieve the Project Purposes

The principal inputs will require the provision of: (1) training; (2) commodities, such as vehicles, some laboratory equipment, teaching aids, medicines; (3) minor renovations to existing laboratory buildings and funds to pay the operating expenses of the project; and (4) technical assistance as necessary.

1. Training

The project will train two physicians as epidemiologists in the U.S. or another country for a period of approximately two years, including up to six months of intensive language training, nine to twelve months of academic work, and three to six months of practical training at the Center for Disease Control or a similar institution.

Following their training, these epidemiologists will be assigned by the Direction of Hygiene and Health Promotion of the Ministry of Health to SLAP where they will direct project activities.

The project will finance the per diems of six nurses and laboratory technicians to be trained in relevant academic and practical aspects of disease control and surveillance. These individuals will be trained at the university and/or at the headquarters of SLAP in Thies. The total training program will last approximately six months.

2. Commodity Support

The project will provide two long-wheel base vehicles to SLAP over the life of the project. These vehicles, along with some already provided in the context of other collaborative efforts between the USAID and SLAP, will be used to transport as many as 20 to 25 trainees and instructors to the field sites during the periodic surveys. Because of the relatively greater distances involved, the two field personnel assigned full time to the Bakel health center will require a pick-up truck to effect the supervision of community health workers and control activities. Their counterparts in Podor will work in a much more centralized situation where all the perimeters are contiguous, one to the other. They will therefore be able to manage with mobylettes alone. The laboratory equipment will be used to equip simple field

laboratories in both Bakel and Podor as well as to provide minimal supplies to the Department of Parasitology laboratories and to those in Thies. The medicines will include drugs such as Chloroquine and Praziguantrel to respectively treat malaria and schistosomiasis as well as those needed to treat other diseases identified in the villages.

3. Operating Expenses

The project will finance the costs of gasoline, per diems, and support staff salaries necessary to execute the program. Per diem will be limited to an amount sufficient to reimburse workers for their actual expenses incurred while working on project-related activities. The project will pay no salary supplement or stipends. The GOS will pay the salaries of the professional staff any additional remuneration necessary to motivate personnel to accept additional responsibilities. The 1.1 million dollars allocated to Senegal is itemized in the following budget.

4. SENEGAL HEALTH COMPONENT BUDGET

ITEM	COST ($'000)
I. TRAINING	
A. Long-Term	
1. Epidemiologist (2) x 2yrs	100
2. Computer Programmer (1) x 1yr	25
B. Short-Term in Senegal	
1. Per diem 6 trainees x 180 days x CFA 3000/day	9
2. Miscellaneous Costs	1
C. Conference and Seminars One/yr x 5 yrs x $ 3000	15
D. Subtotal training	150
II. COMMODITIES	
A. Vehicles	
1. 2 all terrain vehicles at $25,000	50
2. 2 pick ups at $20,000	40
3. 4 mobylettes at $ 1,000	4
4. 25% spare parts	23
5. Subtotal - (Vehicles)	117
B. Drugs	200
C. Office Supplies	18
D. Mini Computer	10
E. Laboratory Equipment	45
	390

III. OPERATING EXPENSES

A. Gasoline

1. Bakel - 1 vehicle x 200lt/month x 60 months x 400 FCFA/lt	16
2. Podor - 5000 CFA/mobylette x 2 mobylettes x 60 Months	2
3. Dakar - 400lt/Survey/vehicle x 2 vehicle/survey x 400 FCFA/lt x 18 surveys	19
4. Total gasoline	104
B. Per diems	50
C. Salaries	
1. Secretary at 100.000 CFA/month x 60 months	20
2. Driver at 60.000 CFA/month x 60 months X 1 driver	12
3. Unskilled worker (2) at 35.000/month	14
4. Total salaries	46
D. Total Operating Expenses	200
IV. RENOVATION	10
V. OCCGE SUPPORT	200
VI. TECHNICAL ASSISTANCE	75
VII. BUDGET SUMMARY	
A. Training	150
B. Equipment	390
C. Operating Budget	200
D. Renovation	10
E. OCCGE Support	200
F. Technical Assistance	75
G. Contingency	75
H. Total	1,100

3.5.9.3. The Mauritania Component

A. Introduction

The Government of the Islamic Republic of Mauritania (GIRM), with financial assistance from the OMVS/USAID-IDP, intends to conduct disease surveillance and control activities in the Senegal River Basin targeted principally against schistosomiasis and malaria. The nutritional status of the population will also be monitored.

The GIRM and USAID are already collaborating in the implementation of two important health projects in country - a primary health care project in the Tarza region, emphasizing the training of village level health workers, and an Expanded Program for Immunization active throughout the SRB. The GIRM and USAID are currently in the final states of designing a health component to include schistosomiasis surveillance and control in areas to be developed as a part of a basic agricultural project.

This schistosomiasis control effort will be directed by a team from the Centre National d'Hygiene (CNH). The director of the CNH, Dr. Sidatt, is a praticularly competent experienced physician who was formerly the senior advisor of the Minister of Health. Dr. Sidatt has an active interest in the control of schistosomiasis, demonstrated by his field visits to study ongoing work in Egypt and Sudan. The CNH has been heavily supported by the Chinese Government, and the CNH staff currently includes seven highly skilled Chinese health professionals, including a parasitologist and a Ph.D. level laboratory expert. The WHO has assigned an epidemiologist to the CNH.

B. The Goal and Purposes of the IDP/HC in Mauritania

The goal and purpose of the program in Mauritania are consistent with those of the IDP/HC in general.

C. Project Outputs

1. Trained Personnel

The project will train two physicians and six nurses and/or laboratory technicians as well as a computer programmer.

The two physicians will be trained as epidemiologists mostly in the U.S., and in the OCCGE centers described below, for a total of 30 months. A typical program might consist of six months of language training; nine to twelve months of academic study leading to a masters degree in epidemiology or public health; six months of practical experience at the Center for Disease Control in Atlanta, Georgia; and

six months of field work in the OCCGE system. Such a program can be modified to increase any particular element of this training to better respond to the needs and interests of the individual trainee.

The six nurses and/or laboratory technicians will be trained in the techniques of disease surveillance and control in the following centers of the OCCGE system: (1) Muraz Center in Bobo Dioulasso for research on malaria, (2) Center for Research on Meningitis and Schistosomiasis (CERMIS) in Niamey; and (3) Organization for Food and Nutrition Research in Africa (ORANA) in Dakar. This training will require between six and nine months.

2. A functional epidemiologic surveillance unit at the national center for hygiene.

3. Two functional surveillance teams based at the regional health centers in Kaedi and Selibaby.

4. Surveys of the prevalence of schistosomiasis, malaria, and malnutrition in SRB villages where IDP-financed irrigated agriculture is being developed.

5. A plan for developing a PHC health services delivery system on the Mauritanian side of the SRB.

D. Project Inputs

USAID will provide a total of 1.7 million dollars for the Health Component, which will be spent in accordance with the budget outlined below.

D. Project Inputs/Budget

Mauritania Health Component Budget in thousands of U.S. $

I. TRAINING			
A. Long Term		232	
1. 2 physicians x 30 months each	125		
2. One computer programmer (12 months)	25		
3. Six nurses	82		
B. Short Term		28	
1. Seminars (International) One year x 5 years x $3000 each	15		
2. In service training annually in Nouakchott $2500 each x 5 years	13		
C. Total Training			260
II. RENOVATION			10
III. EQUIPMENT			
A. Vehicles (six x $25,000 each)	150		
B. Spare parts	75		
C. Laboratory equipment ($30,000 each x 3)	90		
D. Office equipment	20		
E. Mini computer	15		
F. Medicines and molluscacides	200		
G. Camping equipment	7		
H. Audio visual equipment	8		
I. Sub total equipment			565
IV. OPERATING BUDGET			
A. Gasoline 40 liters/day x 15 days/month x 60 months x 3 vehicles x $1.80/liter		200	
B. Per diem 12 persons x 15 dayx/month x 60 months x $14/day		155	
C. Salaries			
1. Computer programmer		40	
2. Secretary CNH		30	
3. 3 Drivers		35	
4. Accountant		30	
5. Other		10	
D. Subtotal			500
V. OCCGE SUPPORT			200
VI. TECHNICAL ASSISTANCE			75
VII. CONTINGENCY			90
VIII. GRAND TOTAL			1,700

3.5.9.4. The Malian Component of the IDP

A. Introduction

Rural health services are essentially nonexistent outside of the regional capitals in Mali. Physicians (often two) and other clinical staff exist at the health center level, located in the capital of a "cercle" or administrative unit of approximately 100,000 - 200,000 people. However, the near total absence of an operating budget renders these health workers barely functional. USAID recently decided not to refinance a primary health care project in the Mopti Region because of concern about the government of Mali's inability to assume the recurrent costs of the project.

The system is in a state of near collapse. However, if the system from Bamako to the periphery is revamped, there will be a chance of improving it. The GOM, with financing from the World Bank, proposes such a revamping in three cercles in the Kayes Region -Bafoulabe/Mahina, Kenieba, and Kita. The project to be financed by the World Bank will not affect the Kayes cercle.

B. Other Donors

1. The World Bank

The project to be finance by the World Bank - the Health Development Project - will address Mali's difficult situation by: (1) providing health services through village health team; (2) retraining MOH personnel and infrastructure development; (3) improving the initial medical and paramedical training by providing an early opportunity for field work at the Mahina Branch of the National Institute for Public Health Research (INRSP); (4) improving the supply of essential drugs, including chloroquine; and (5) strengthening the capacity of the MOH to implement and evaluate the planned project as well as to plan for its modification and expansion.

In addition to the HDP, at least two other activities planned for the Kayes Region will have immediate relevance for the IDP health component, including the construction of the Manantali Dam and the subsequent relocation of approximately twelve thousand people and the eventual extension of the Onchocerciasis Control Project (OCP) from the Volta River Basin to include the basins of the Senegal and Gambia Rivers (The Senegambia Project).

2. Manantali Resettlement/USAID

USAID/Mali will finance the relocation of people currently living in 24 villages to be flooded by the lake. These people will be regrouped into four new villages. The USAID-financed resettlement project will construct dispensaries and wells in the new villages. MOH personnel will staff these dispensaries, and the IDP will provide support services to these dispensaries as it does to the others in the target cercles.

3. OCP/"Mini Program"

Control of onchocerciasis in Mali's First Region is a high priority. A recent epidemiologic study conducted by the medical school in the HDP zone revealed that 54.6 percent of men over age 45 have positive skin snips for onchocerciasis. Seventeen percent men over 45 have occular indications of the disease.

To permanently reduce transmission of onchocerciasis in the Kayes Region, control of the disease throughout the Sene-Gambie Basin will be necessary. A strategy similar to the one currently employed in the Volta River Basin, which requires applying larvacides from helicopters, will be extremely expensive. Donor commitment to this extension of the OCP is not certain. The OCP is currently conducting a feasibility study, which will be discussed at the meeting in Bamako in December 1982.

Another more urgent problem involving onchocerciasis control will be what can be done to protect the 10,000 workers who will construct the Manantali Dam as well as their families. Many of these people will be immigrants to the area and thus previously unexposed to onchocerciasis. Protecting these people from infection, as well as protecting the workers from the extreme nuisance of bites from the simulium fly will therefore be a high priority. This type of protection can be achieved by very limited larvaciding for a distance of approximately 75 kilometers upstream and downstream from the dam site on the Bafing River. Using boats instread of helicopters to disperse the larvacide should cost less than $250,000 per year. At an OMVS-sponsored meeting in Dakar, 26-27 May, 1982, the UNDP agreed to finance the first year of this limited control activity around the dam site. This activity is referred to as the "mini-program". Onchocerciasis control is, therefore, not a part of this project.

C. Project Strategy

Every attempt possible must be made to assure that the surveillance systems and control activities developed in the course of this project are compatible with the human and financial resources available to the GOM when the project financing terminates. It is therefore not useful to artificially shore up, for the life of the project, a unit in the health system, such as the Kayes Health Center, which would otherwise not be viable. For these reasons, the project will be based in the research and training center in Mahina in the Bafoulabe cercle, whose activities will be integrated into the model health centers to be financed by the PDS. Teams from the Mahina center will conduct surveillance activities in the Kayes cercle where the irrigated perimeters to be renovated with USAID financing are located. The project will not, however, make an independent effort to render functional the Kayes cercle health center. This would be financially ill-advised and managerially impossible in the context of this project.

D. The Goals and Purposes of the IDP Health Component in Mali

The goal is to help the MOH prevent the deterioration of the health status of the population in the Kayes Region secondary to the ecological changes that will take place with the construction of the Manantali Dam and the expansion of irrigated agriculture. A principal project purpose is to strengthen the research and training center to be located in Mahina and administered by the INSRP by establishing an Epidemiologic Surveillance Unit at the Center and testing approaches to the control of certain target diseases. The epidemiologic surveillance unit at the Mahina Center will have three objectives: (1) to conduct epidemiologic surveys of specific diseases in the villages where irrigated perimeters will be constructed in the Kayes cercle, in villages to be influenced by the construction of the Dam and its reservoir, and in any other villages determined to be of priority interest; (2) to provide technical support to the health center personnel to help them design surveillance and monitoring systems appropriate to interventions they will conduct and to enable these personnel to conduct limited disease control activities; and (3) to train medical and para-medical students in the theory and practice of epidemiologic surveys and surveillance.

E. Inputs Necessary to Achieve the IDP Purposes

The principal inputs will involve: (1) training and technical assistance; (2) renovation and equipping of the center's buildings; (3) logistical support; (4) medication and supplies; and (5) operating expense support.

1. Training

Training will take place on at least three different levels. First, the staff of the Surveillance Unit will be trained. The GOM will propose a physician and a nurse to be trained in issues related to the surveillance and control of schistosomiasis, malaria, onchocerciasis, and malnutrition. These two individuals will then be trained for approximately nine to twelve months in various centers of the OCCGE: the Muraz center for Malaria in Bobo Dioulasso, the Research Center on Meningitis and Schistosomiasis in Niamey, Niger - (CERMIS); the Institute for Research Trypanosomiasis and Onchocerciacis (IRTO) in Bouake, Ivory Coast; and ORANA in Dakar.

Following completion of this initial training, the two individuals will assume their duties at the Mahina Center. The physician will be the director of the center. The physician will direct the center's activities for a period of one year. If at the end of that period he has performed adequately and has demonstrated the proper motivation to

the MOH and USAID, he will be considered for academic training in a U.S. public health school and for short-term training in epidemiology with the Center for Disease Control (CDC) in Atlanta, Georgia.

A second physician and nurse will follow an identical training program with the OCCGE. The second physician will assume the responsibilities of the first at the Mahina Center while the first is continuing his training in the U.S. The second nurse will be permanently assigned to the Mahina Center. If the second physician performs adequately at the Mahina Center, he too will be considered for U.S. training.

At a second level, the staff from the Surveillance Unit, personnel from the Medical School or MOH in Bamako, and short-term technical assistants hired by the project will conduct in-service training in the Kayes Region. Targets of this in-service training in the principles of epidemiologic surveillance and disease control will be the staff of the health centers and dispensaries. At a third level, medical and paramedical students from the training schools in Bamako will spend approximately one month in the Mahina Center as part of their normal rotation. They will receive practical training in the principles of survey design, implementation, and data analysis by participating in these activities during their rotation.

2. Technical Assistance

Short-term technical assistance to the project staff at the Mahina Center will come from two sources: (a) Government of Mali Institutions such as the School of Medicine and the Ministry of Health, and (b) the OCCGE.

The objectives of the short-term technical assistance is to provide the subspecialized skills in parasitology, entomology, and malacology, which will be required to design and implement the epidemiologic studies envisaged. Collaboration between GOM experts and those from the OCCGE will assure that the methodologies respond to the priorities of the GOM and at the same time are as compatible as possible with those being used in Senegal and Mauritania. Short-term technical assistants from the OCCGE will also assure the follow-up supervision of the staff trained at the OCCGE and the appropriate revision of this training reflect realities encountered in the field.

3. Renovation

Presently, the health center in Mahina occupies three large deteriorating buldings in addition to two staff houses. The HDP plans to build a new health center in a new location. The buildings to be

evaluated will be converted into the Mahina branch of the INRSP. The IDP will renovate the third building to be used as dormitory space. The IDP will provide all the necessary laboratory office, classroom, library and home equipment, supplies, and furnishings. The two houses will be renovated by the project; one to house the project director and the other to serve as a guest house.

4. Logistic Support

The IDP will provide three all-terrain vehicles over the life of the project so that the center has two serviceable vehicles available at all times.

5. Commodities

The IDP will completely equip a laboratory at the Mahina Center to enable staff to accomplish all routine examinations necessary to evaluate the prevalence of the target diseases in the field. The project will provide office equipment and furnishings for the surveillance unit as well as a library. The IDP will purchase a number of books and training material to be used by the trainees at the Center. The house of the director and the guest house will be furnished by the project.

6. Operating Budget

The IDP will provide the surveillance unit an operating budget to include the following:

1) Per diems for full time center staff and visiting experts from Bamako for field work. These per diems are intended only to reimburse individuals for personal expenses they are obliged to incur as a result of their work at the center. As long as housing and/or food are provided, the per diems will be modest. They will not be sufficient to encourage people to work at the center. Such work will be viewed as part of an individual's overall responsibility to the MOH or to the medical school or as a function of his personal research interest.

2) Gasoline maintenance and repair of project vehicles.

3) Salaries for certain support staff such as guardians, chauffeurs, cooks, and cleaning persons.

4) Expendable supplies - both office and laboratory.

The budget is itemized as follows:

6. MALI HEALTH COMPONENT BUDGET

ITEM	COST ($ 000)
I. TRAINING	
A. Long Term	
1. Physicians U.S. 15 months x 2 x $ 25,000/year	75
8 months OCCGE x $ 1,500/month x 2	24
2. Nurses (2) + Laboratory technicians (2) 8 months OCCGE x $ 1,500/month x 4	46
3. Subtotal	145
B. Short Term	10
Per diem for seminars at the Mahina Center 15 people x 5,000FM/day x 5 days x 3/year x 5 years	
C. International Seminars	15
D. Subtotal Training	170
II. COMMODITIES	
A. Vehicles - 4 x $ 25,000 + 25%	125
B. Medicines and miscellaneous	200
C. Audio-Visual and Library	15
D. Laboratory Equipment	30
E. Office Equipment	30
	400

* One dollar US = FM 600

II. COMMODITIES	
A. Vehicles 4 x $ 25,000 + 25%	125
B. Medicines and miscellaneous	200
C. Audio-Visual and Library	15
D. Laboratory Equipment	30
E. Office Equipment	30
	400
III. OPERATING EXPENSES	
A. Per diems 3000 FM/day x 20 people/survey x 13 surveys x 30	39
B. Per diems - other field work 3000 FM/day x 60 days/year x 6 people x 5 years	9
C. Gasoline 2 vehicles x 300lt/month x 60 Months x FM 800/liter	48
D. Salaries Cook, driver(2), secretary + guardian, manual worker	34
E. Sub Total	130
IV. RENOVATION	50
V. OCCGE SUPPORT	200
VI. TECHNICAL ASSISTANCE	75
VII. CONTINGENCY	75
VIII. GRAND TOTAL	1,100

F. Project Outputs

1. Personnel Trained

At least one and probably two academically and practically trained medical epidemiologists and two practically trained nurses. These four individuals will have had a minimum of six months of training at the OCCGE.

2. Disease Prevalence Surveys

Annual surveys of target diseases, in the rainy season and in the dry season, including malnutrition, will be conducted, accompanied by appropriate vector studies. These studies will be concentrated in villages with operating irrigated perimeters or which will be influenced by the creation of the reservoir behind the dam. Other villages will be included as deemed desirable by the personnel of the surveillance unit.

3. A System of Ongoing Surveillance for Sexually Transmitted Disease (STD)

Personnel from the surveillance unit will assist the staff of the health center in the village to be created for the dam construction workers to conduct surveillance against these diseases. By the end of the project, the staff will have prepared a series of quarterly reports concerning consultations for the major STD's including venereal syphillis and gonnorrhea. The number and selection of specific diseases to be monitored will be decided by the staff of the health center in conjunction with the staff of the surveillance unit. As a pre-condition to establishing continuing disease surveillance, the staff of the health center will be trained in the clinical and laboratory diagnosis of the target STD's.

4. Protocols for Monitoring Disease-Specific Interventions

At the fixed centers supported by the HDP (Mali) and in selected villages where community health workers will be trained, the PDS staff will initiate interventions directed at specific high priority health problems. These interventions should include, but not be limited to, chloroquine chemotherapy or chemoprophylaxis against malaria; the use of oral rehydration salts and nutrition education to minimize morbidity and mortality due to diarrhea in small children; and immunization against measles, tetanus, tuberculosis, pertussis, and perhaps polio. To evaluate the effectiveness of these interventions, some parameters will have to be set and followed. These may include morbidity or

mortality due to the disease, or may be limited to information concerning utilization of services such as number of children treated with oral dehydration by mouth or vaccine coverage in a defined population.

Either the full-time staff of the surveillance unit or short-term consultants will be available to provide advice, if requested by the PDS personnel, on the development of such monitoring system.

5. Ad Hoc Surveys of Health Problems of Particular Interest or Importance

The staff of the surveillance unit will be available, as needed and as time permits, to help MOH medical school, or HDP authorities conduct epidemiologic surveillance relative to endemic diseases unrelated to the anticipated ecologic changes in the region or for disease epidemics that may occur. An example of the former might be epidemiologic investigations of Guinea worm shown by the HDP survey to represent a major constraint to agricultural productivity in some villages (e.g., up to 23 percent of people infested with an average case case lose 54 work days per year). An example of the latter might be epidemiologic investigations of outbreaks of meningitis or yellow fever.

3.5.9.5. Relationship with OCCGE

The OCCGE, created in 1960, is one of the oldest intergovernmental organizations in Africa. It is currently conducting research on the surveillance and control of health problems with which this project is concerned. Such research is ongoing at the level of health workers from the member states in malaria, malnutrition, and schistosomiasis control at the Muraz Center in Bobo Dioulasso, the Meningitis and Schistosomiasis Research Center (CERNDS) in Niamey, and in the Organization for Food and Nutrition Research in Africa (ORANA) in Dakar. Given its longstanding history of first class public health research, its official stature in each member state, and its ongoing training activities, the OCCGE should provide short-term training necessary for IDP/HC field workers. If it has the necessary human and financial resources, the OCCGE may also be willing to provide much of the on-site short-term technical assistance required to assure as much uniformity of approach as possible concerning disease surveillance and control methodologies among the three countries. Using OCCGE technicians to provide the short-term technical assistance has the great advantage of providing continuity between training and field work, an often ignored but critically important development link.

If the OCCGE is to significantly increase its training activities and to provide short-term technical assistance to the IDP/HC field workers, its permanent staff must be reinforced. To provide support and to contribute to the training of member state scientists, the IDP proposes recruiting three people from the OMVS member states to be trained in parasitology, vector control, and nutrition surveillance. These individuals would be experienced, well-trained biomedical scientists with the academic background necessary to begin their jobs prior to training.

The project would provide these scientists with 12-15 months of U.S. training to equip them to read the English public health literature and to become familiar with American public health concepts as well as to teach them the specific job related skills. A typical training program might include three months of intensive English and twelve months of practical training at a research center such as the CDC or at an academic institution with an interest in tropical health problems.

Following their training, they would assume their posts as full-time employees of the OCCGE with appointments limited to five years. All supervision and administrative support would come from the OCCGE. All contractual arrangements would be between the OCCGE and the scientists. Salaries would be on the same scale as other African scientists working for the OCCGE.

The IDP will in turn reimburse the OCCGE for all costs relative to the support of these three scientists, including their salaries, travel, and per diems. The IDP will also make modest contributions to the OCCGE to enable them to better function as a training institution. Such support might include laboratory equipment or audio-visual equipment.

Once hired by the OCCGE, the three scientists would be expected to perform according to the statements of work described in Section 3.5.8. Seventy-five percent of their time will be devoted in project related training and technical assistance in the field. The other 25 percent would be spent on research and training activities of mutual interest to the OCCGE and the scientists but not necessarily directly related to the project.

The above plan for IDP support to the OCCGE is contingent upon the successful negotiation of a contract with the OCCGE, which must in turn be approved by the governing board of directors of OCCGE and the advisory board made up of the Ministers of Health of each of the member states.

An illustrative budget for support to the OCCGE might be as follows:

I.	Salaries and Benefits for the 3 scientists $ 30,00/year/Scientist x 5 years	450,000
II.	Operational Expenses	
	A. Per diems	100,000
	B. Gasoline 3 vehicles x 300 lt/Mo x 60 Mo x $1.10/lt	59,400
III.	Commodities	
	A. 3 all terrain vehicles $25,000 + 50% spare parts	113,000
	B. Laboratory Equipment $15,000 x 3 labs	45,000
	C. Audio-visual equipment	15,000
IV.	Contingency	17,600
V.	Total	800,000

If, for whatever reason, agreement cannot be reached with the OCCGE as to the terms of support, the three scientists will be assigned to the health unit in the OMVS High Commission.

The selection of the individuals to be assigned to the OCCGE or to the OMVS Secretariate will be through a highly competitive process. The final selection will be made by a committee representing each member state, the OMVS, OCCGE, and USAID. The opinion of the organization to ultimately support these individuals will obviously be the most important consideration. All candidates must, however, be approved by the IDP project director before training begins.

Figure A

SENEGAL RIVER BASIN

1A

RAINFALL PATTERN

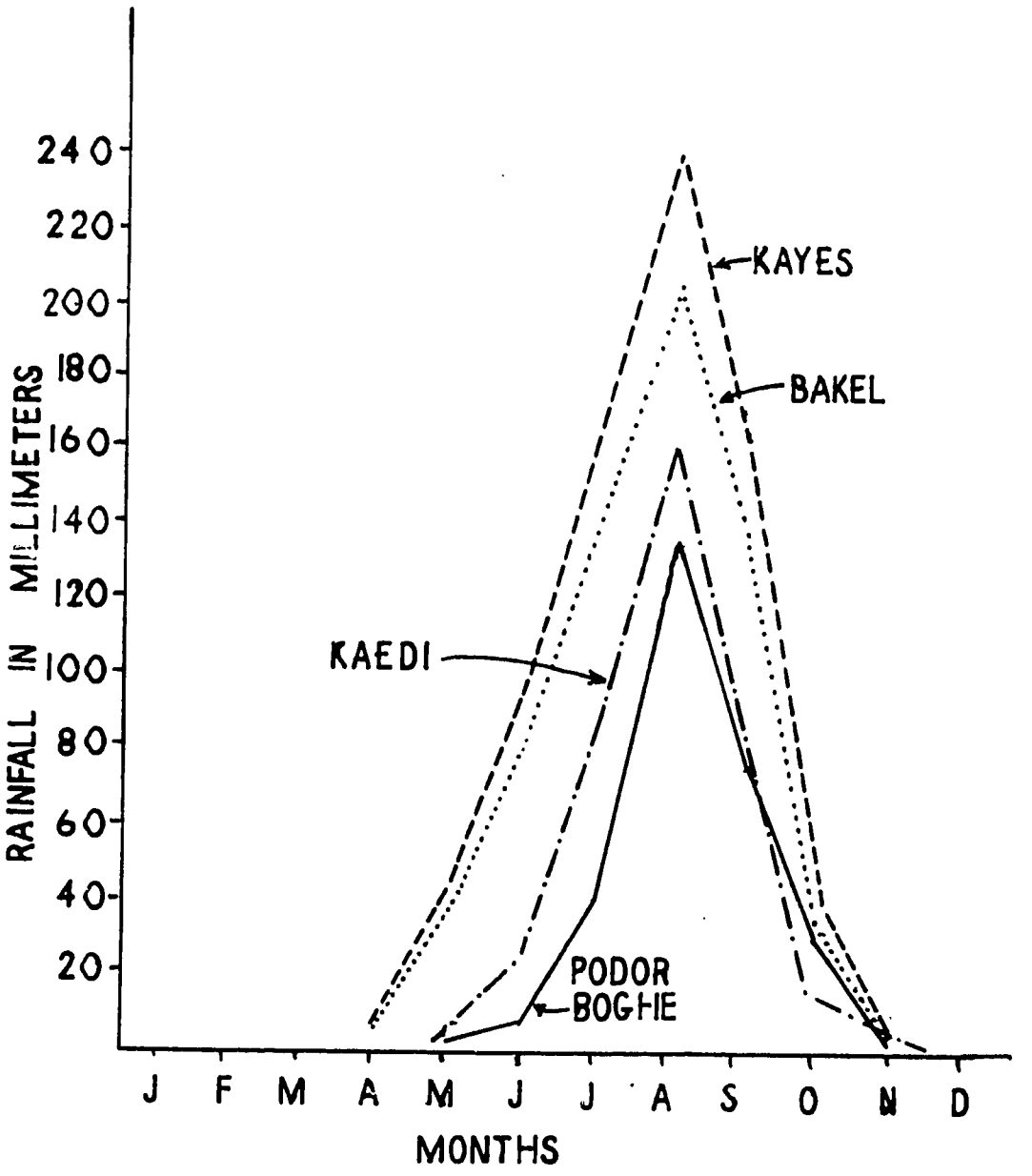


Figure B

SCHEMATIC DIAGRAM OF SENEGAL RIVER BASIN

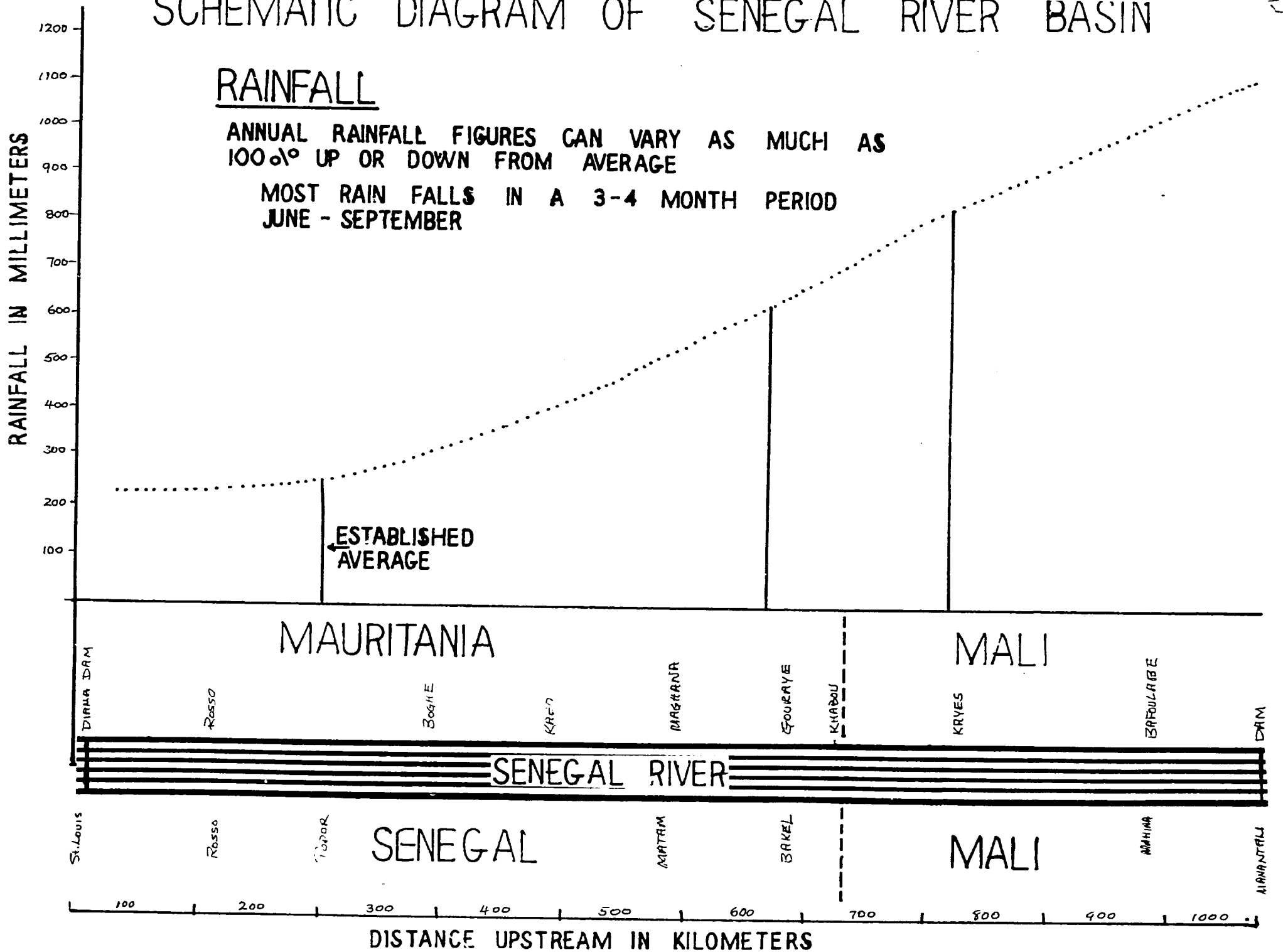


Figure C

SCHEMATIC DIAGRAM OF SENEGAL RIVER BASIN

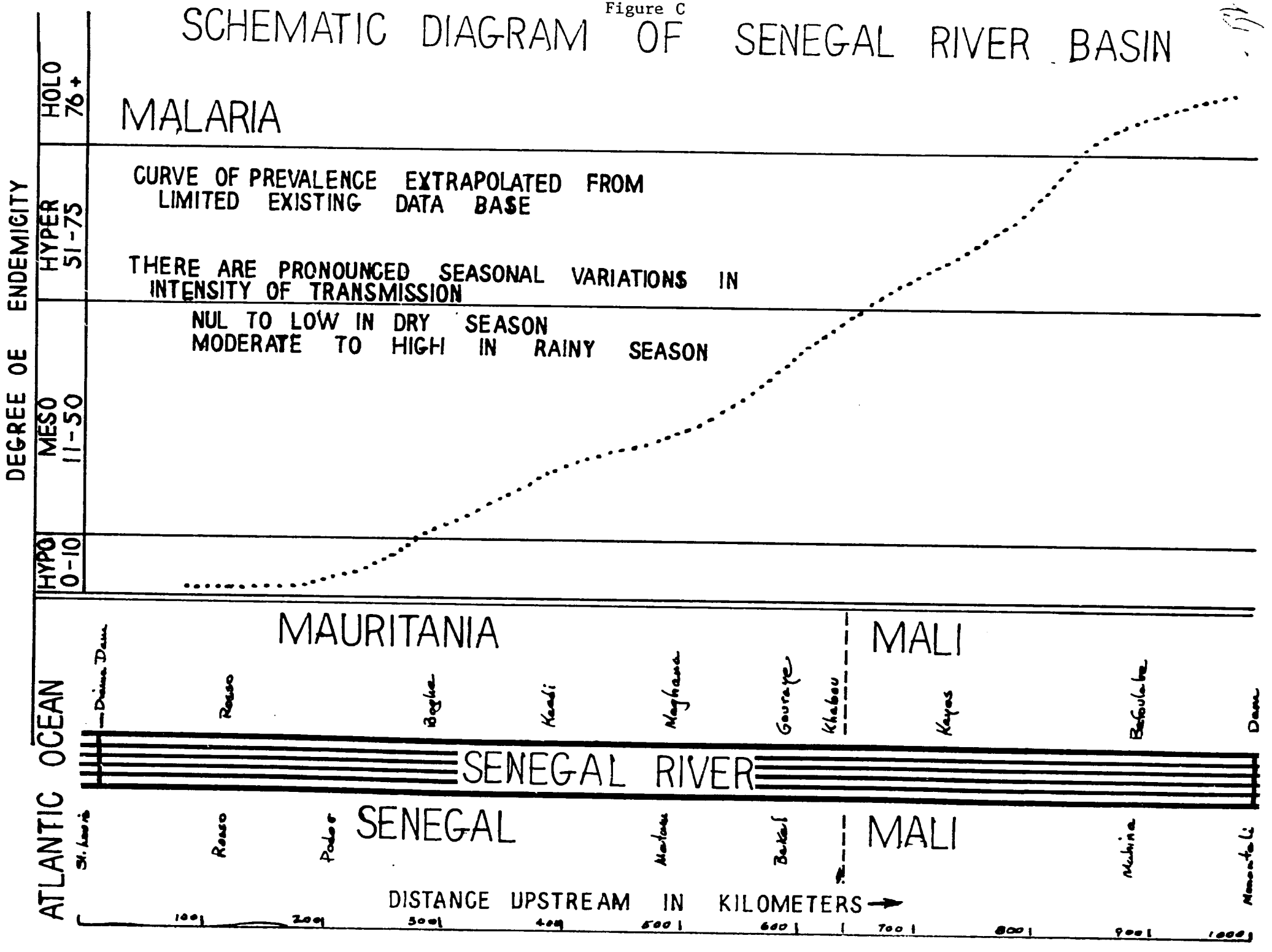


Figure D

SCHEMATIC DIAGRAM OF SENEGAL RIVER BASIN

ONCHOCERCIASIS

MAURITANIA - NONE

SENEGAL - NONE UNTIL BAKEL, INCREASING UPSTREAM UP THE FALEME RIVER

MALI - INTENSITY LEVEL RISES GOING UPSTREAM

PREVALENCE RATES WILL BE QUITE STABLE FOR A GIVEN VILLAGE BUT VARY WIDELY FROM VILLAGE TO VILLAGE

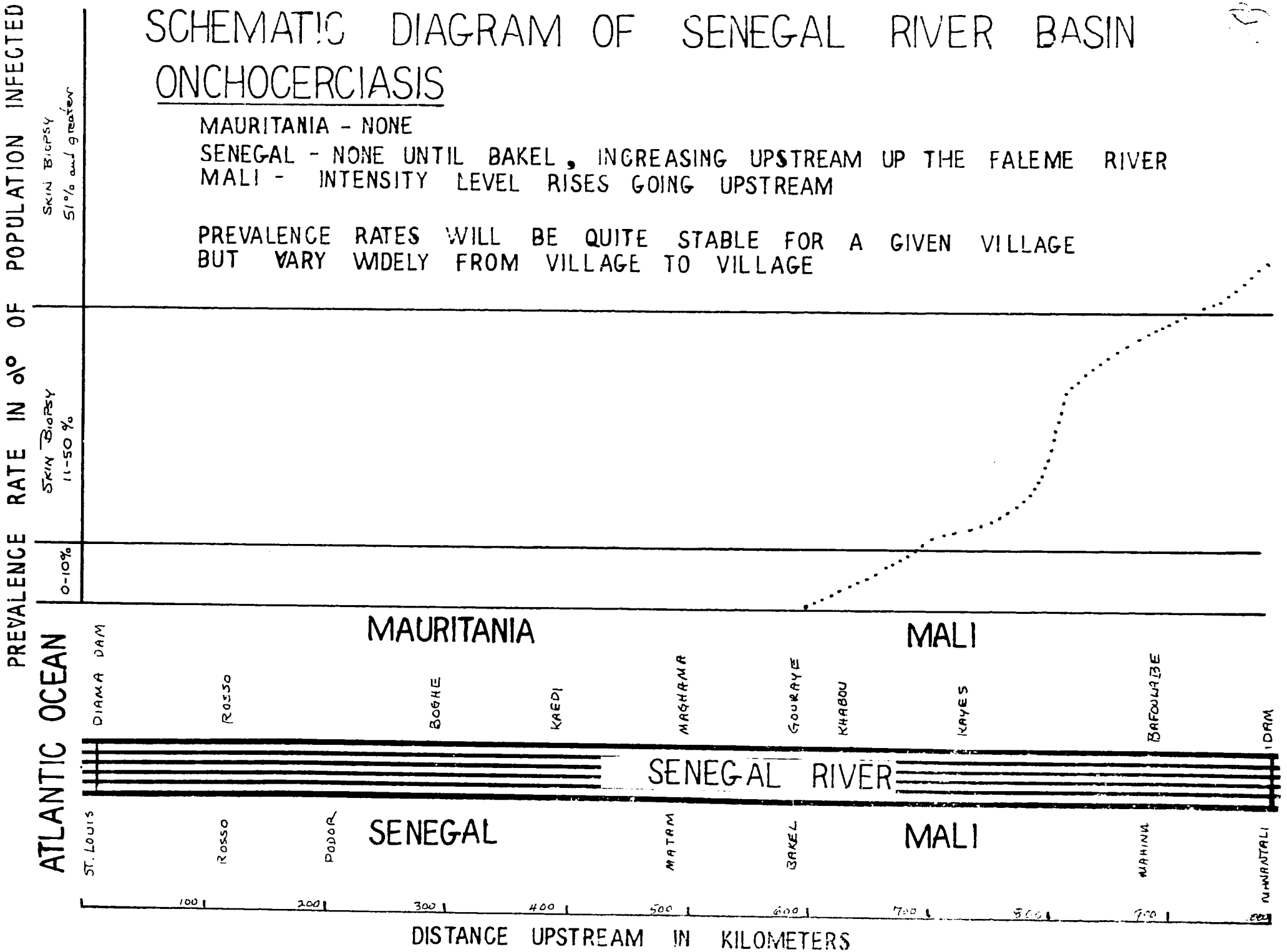


Figure E

MATRIX FOR THE STUDY AND ASSESSMENT OF IMPACTS RESULTING FROM ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

		Main proposed actions																	
		Environmental modification							Environmental manipulation										
		In man made reservoirs and other still waters				In man made courses and other flowing waters			In man made reservoirs and other still waters					In man made courses and other flowing waters			In all types of water bodies		
		Cutting, deepening and filling	Dyking and dewatering	Drainage in catchment area	Consolidation of shores	Rectification of courses and cross sections	Consolidation and lining	Conversion of open to closed conduits	Basin preparation and maintenance	Cutting of trees and shrubs	Vegetation clearance	Shore maintenance	Water level fluctuation	Dredging and desilting	Vegetation clearance	Intermittent flow and flushing drying	Manipulation of biological pollution	Manipulation of salinity in coastal areas	Manipulation of vegetation to provide shade or sunlight
Main elements and sectors of the environment likely to be affected																			
Topsoil structure	Erosion/silting																		
	Disintegration/dust																		
	Acidity/alkalinity																		
	Ion exchange/salinity																		
	Aeration																		
	Microbial content																		
	Helminths and insects																		
Water	Surface flow and seepage																		
	Groundwater flow and recharge																		
	Water quality/pollution																		
Vegetation cover	Trees and shrubs																		
	Grass and weeds																		
	Aquatic plants																		
	Cultivated crops																		
Wildlife	Fish																		
	Birds																		
	Other animals																		
Human activities and interests	Irrigation																		
	Agriculture																		
	Fisheries																		
	Flood control																		
	Land reclamation																		
	Recreation																		
	Communications																		
	Cultural assets																		
	Aesthetic assets																		

Notes on the use of the matrix

The effects on the environment resulting from environmental management measures for vector control can be assessed subjectively and shown quantitatively in this matrix, by using a rating for "magnitude" (the extent of the effect in space, time, population affected, etc.) and another for "importance" (the intensity or the relative seriousness of the effect)

1. Rate magnitude and importance between 1 and 10, 1 for the least and 10 for the greatest impact. Use a plus sign to indicate a beneficial effect and a minus sign for a detrimental effect
2. Show the ratings in the relevant blocks of the matrix by recording two numbers, separated by a diagonal line, one for the magnitude and one for the importance of the impact; each pair of numbers should have its own plus or minus sign
3. Actions that offer the most beneficial effects and the least adverse effects should be preferred in the choice and design of a control strategy

TABLE I

Summary Disease Statement for the Senegal River Valley

A. Important diseases certain to be affected by water management (not necessarily adversely)

Malaria- P. falciparum, some P. malariae & P. ovale
Schistosomiasis-principally S. haematobium, some S. mansoni
Onchocerciasis -in Malian portion of Senegal River Basin
(Dracontiasis) (Guinea worm) - in "djeri" lands peripheral to Senegal River Basin lands

B. Diseases of current lesser importance likely or possibly to be affected by water management:

Filariasis- principally Wuchereria bancrofti, mosquito borne
Dengue types 1 and 2 - mosquito borne
Yellow fever- mosquito borne
Chikungunya - mosquito borne
West Nile virus - mosquito borne
Rift Valley Fever virus - probably mosquito borne
Sandfly fever - Phlebotomus transmitted
Leptospirosis - at streamsides, quiet pools, marshy ground
Cutaneous leishmaniasis - Phlebotomus transmitted
Cholera - often water-borne
Dysenteries: bacterial, viral, protozoal -often water-associated
Typhoid fever - usually water-associated

C. Diseases not directly affected by water management

Bacterial or viral etiology:

Measles, mumps, chicken pox, whooping cough, pneumonia, influenza diphtheria, rheumatic fever, meningococcus meningitis, hepatitis tuberculosis, leprosy, poliomyelitis, syphilis, endemic treponematosis, gonorrhea, trachoma, brucellosis &c.

Parasitic etiology:

ascariasis, hookworm infestation, strongyloidiasis, pinworm, tapeworms, amebiasis, &c.
rickettsioses - ticks are abundant on wild animals and on livestock

Mycotic etiology: fungus diseases are common.

D. Nutrition -increased irrigated agriculture and more food being produced should have favorable effects. Disturbance of traditional food habits and patterns could have adverse effects.

E. Potential threats to health- infections not currently recognized as causing disease in the valley:

Lassa fever - rodent associated
Ebola virus diaease- transmission cycle not known. Antibodies have been found in population.
Congo-Crimean hemorrhagic fever- virus isolated from ticks in valley. Antibodies in population. Disease not recognized.
Rift Valley fever- Antibodies in population. No disease known in livestock. No human disease reported.

Note: the Category "C" is practically a chapter heading for a textbook on infectious disease. The USAID-IDP epidemiologist is expected to be on the lookout for these and other infectious diseases, unrecognized as yet or possibly unknown.

TABLE I (2)

1980				
Gande	45+/316	14.4%	55+/316	17.5%
Ballou	49+/515	9.5%	117+/515	22.7%
Senedoubou	66+/369	17.8%	141+/369	38.2%
SLAP survey (Bakel region 1968)				
Golmi	20+/43	46.0%	24+/40	60.0%
Kounghani	25+/40	62.5%	30+/40	75.0%
APHA survey (Bakel region, 1977)				
Golmi			26+/140	18.6%
Kounghani			69+/175	39.4%
Mauritania Gannett-Fleming survey				
Apr-May 1978				
Olo Ologo	3+/11	27.2%	1+/10	10.0%
Zenaiga-Maures	3+/4	75.0%	0+/4	0.0%
Youmane Yira	1+/29	3.4%	3+/13	23.1%
Amadou Moussa	1+/12	8.3%	1+/9	11.1%
Roufi Aoudi	2+/8	25.0%	1+/6	16.7%
Sori Male	4+/17	23.5%	3+/17	17.6%
Ngorel	0+/12	0.0%	2+/11	18.2%
Keur Mour	1+/19	5.2%	2+/17	11.8%
Keur Massene	0+/20	0.0%	1+/20	5.0%
Dar Salaam	0+/11	0.0%	0+/11	0.0%
CNH (GIRM) survey 1980 (Oasis villages, N of Valley)				
Oudei Lefkerine		4.5%		
Boussoneilif		9.1%		
Boudjoungol		8.3%		
Touerdima		37.5%		
Timbara		24.6%		
Ameira		10.0%		
Oudei Chrak		17.4%		
Toveizekre (sp.?)		41.7%		
Mali Gannett-Fleming Jan-Feb 1978				
Manantali	2+/9	22.2%	4+/9	44.4%
Soukoutali	12+/21	57.1%	2+/16	12.5%
Tondidji	4+/19	21.0%	0+/12	0.0%
Banko	7+/9	77.8%	1+/9	11.1%
Madina	14+/27	51.8%	2+/18	11.1%
Koumakire	8+/20	40.0%	1+/15	6.7%
Bakouru Fata	14+/21	66.7%	1+/18	5.5%
Beretekounda	6+/13	46.1%	2+/9	22.2%
Tantoudji	3+/10	30.0%	2+/10	20.0%
Moussagouya	7+/16	43.7%	1+/13	7.7%
Mamadouya	7+/14	50.0%	3+/13	23.1%

Note: These malaria data are about all that exist for the region. They are very scanty. The number of communities getting even a casual examination is very small, and the proportion of individuals examined even smaller. The only examinations in depth are those of the SLAP (Senegal) in the Bakel region, for 1978, 1979, 1980, of which only the 1980 data are cited above. These data are limited to three villages. Data are at hand for age specific malaria rates for a few of above villages, but are not presented here.

TABLE 2

Arthropods Collected Or Reported from the Senegal River Valley

Arthropods collected or reported from the Senegal River Valley

Mosquitoes: Anopheles gambiae; A. pharoensis; A. rufipes; A. ziemanni; Aedes aegypti; A. simpsoni; A. africanus; A. luteocephalus; A.vittatus; Culex univittatus; C. poicilipes; C. fatigans; C. antennatus; Mansonia uniformis; M. africanus

Culicoides: several species

Sandflies (Phlebotomus): Phlebotomus duboscqi, Sergentomyia, S. schwetzi, S. dubia, S. magna, S. bedfordi, S. squamipleuris, S. clydei, S. antennata, S. sintonicus

Fleas: Xenopsylla cheopis, Synosternus pallidus

Ticks: Rhipicephalus cuspidatus, R. muhsamae, R. sulcatus, R. evertsi, R. (guilhoni ?) Hyalomma impeltatum, H. truncatum, Amblyomma variegatum, Boophilus decoloratus, Alecterobius capensis

Snails: Bulinus guernei, B. senegalensis, S. globosus, S. joussaume, B. forskalii, Biomphalaria pfeifferi

TABLE 3

Malaria Data Colected for Selected Senegal River Valley Communities

Community	Spleen Rate		Parasite Rate	
	No.Exam.	Rate	No.Exam.	Rate
Senegal Yale Survey-1977				
Lampsar	16+/85	23.5%	46+/274	16.8%
Savoigne	20+/85	23.5%	9+/215	4.2%
Kassack Sud	9+/78	11.5%	9+/204	4.4%
Kassack Nord	34+/89	38.2%	3+/233	1.3%
Ronkh	0+/26	0.0%	0+/102	0.0%
Gannett-Fleming survey 1977-1978				
Agname	1+/31	3.2%	0+/31	0.0%
Darou Salam	1+/43	2.3%	9+/43	20.9%
Niandane	0+/29	0.0%	0+/29	0.0%
Dado	0+/45	0.0%	9+/45	20.0%
Doumga	1+/28	3.6%	9+/28	32.1%
Deamdiora	0+/47	0.0%	21+/47	44.7%
Navel	13+/53	24.5%	12+/33	36.3%
Foume Hara Deboule	14+/43	32.5%	2+/23	8.7%
Koungane	11+/31	35.5%	.....	.....
Pakh	2+/12	16.7%	2+/12	16.7%
SLAP (Bakel region)				

Table 4

Schistosomiasis in the Senegal River Valley Part 1 Senegal
Schistosoma haematobium: urine examination for eggs

Region & Site	Examiner and Date	No.Examined	Rate
Delta & Lower Valley			
St. Louis school children*	Marill 1960	70+/199	35%
	Bereni et al 1968	131+659	20%
	Bereni et al 1972	49+/369	13.3%
	Lemasson 1980	116+/1446	8%
Lampsar	Yale 1977	6+/222	3%
Lampsar	Yale 1979		
Lampsar	Masson 1980	27+/143	19%
Lampsar	Yale 1981		46%
Savoigne	Yale 1977	0+/189	0%
Kassack Sud	Yale 1977	0+/158	0%
Kassack Nord	Yale 1977	1+/139	.07%
Ronkh	Yale 1977	0+/115	0%
several villages	Lemasson 1980	0+/1570	0%
Middle Valley			
Podor	Watson 1969		17.5%
	Lemasson 1980	10+/87	11.1%
Matam	Watson 1969		11.8%
	Lemasson 1980	7+/68	10.3%
Bakel	Watson 1969		22%
Gande	SLAP 1980	14+/1236	1.1%
Ballou	SLAP 1980	739+/1758	42%
Senedebou	SLAP 1980	65+/1480	4.4%

*Most of St.Louis school children come from the Casamance and Sine Saloum, both of which are regions with known endemic schistosomiasis.

TABLE 4 (Cont.)

Schistosomiasis in the Senegal River Valley Part 2 Mauritania
Schistosoma haematobium: urine examination for eggs

Region and Site	Examiner and Year	No.Examined	Rate
Delta and Lower Valley			
Rosso	Watson 1969		2.1%
Keur Mour	Gannett-Fleming 1979	0+/73	0%
Keur Massene	Gannett-Fleming 1979	0+/69	0%
Dar Salam	Gannett-Fleming 1979	0+/48	0%
Pakh	Gannett-Fleming 1979	0+/32	0%
Middle Valley			
Boghe	Watson 1969		2.6%
Diaghama	Watson 1969		11.1%
Kaedi	Watson 1969		9.7%
Kaedi	Jobin 1975		14%
Middle Valley (dieri)			
Agname	Gannett-Fleming 1979	4+/101	3.9%
Darou Salam	" " "	0+/69	0%
Doumga Oura Alfa	" " "	11+/72	15.3%
Diamwely	" " "	6+/89	6.7%
Zeneiga Maures	" " "	18+/44	40.0%
Middle Valley (walo)			
Diandane	" " "	2+/126	1.6%
Dada	" " "	1+/130	0.08%
Synthion Dianidoro	" " "	0+/90	0%
Navel	" " "	1+/79	1.3%
Koungane	" " "	2+/75	2.7%
Olo Ologo	" " "	0+/60	0%
Youmane Yire	" " "	0+/72	0%
Amadou Moussa	" " "	2+/53	3.8%
Roufi Aoudi	" " "	0+/64	0%
Sore Mala	" " "	1+/70	1.4%
Ngorel	" " "	0+/59	0%

Note: Clinical malaria cases reported of the Valley in 1976:

Senegal	47,289
Mauritania	25,257
Mali	46,081

TABLE 4 (cont.)

Schistosomiasis in the Senegal River Basin, Mali
Schistosoma haematobium: urine examination for eggs

Region and Site	Examiner and Date	No.Examined	Rate
Upper Valley			
Diamou	Watson 1969	37+/108	34.9%
Babola	Watson 1969	12+/76	15.9%
Upper Valley-Region of Kayes			
Mahina	Watson 1969	13+/124	34.9%
Kakoulou	Watson 1969	16+/30	51.3%
Moussagouya	Watson 1969	22+/43	51.7%
Mamoudouga	Watson 1969	10+/36	27.7%
several other villages	Watson 1969		0%
Upper Valley-region to be inundated			
Manantali	Gannett-Fleming 1979	2+/37	0%
Soukoutali	Gannett-Fleming 1979	2+/74	2.7%
Tondidji	Gannett-Fleming 1979	1+/78	1.3%
Tabtoudji	Gannett-Fleming 1979	2+/63	3.1%
Upper Valley-resettlement area			
Banko	Gannett-Fleming 1979	4+/52	7.7%
Madina	Gannett-Fleming 1979	12+/46	26.1%
Koumakire	Gannett-Fleming 1979	3+/82	3.7%
Beretekoundi	Gannett-Fleming 1979	2+/63	3.2%
Bakourufata	Gannett-Fleming 1979	2+/51	3.9%

Table 5

Onchocerciasis in the Senegal River Valley
Examination made by skin snip

Region and Site	Examiner and Date	No.Examined	Rate
Senegal	no data		
Mauritania	no data		
Mali:			
Manantali	Gannett-Fleming 1979	6+/10	60%
Soukoutali	" " "	4+/9	44%
Tondidji	" " :	1+/9	11%
Banko	" " "	3+/8	38%
Madina	" " "	2+/12	17%
Koumakire	" " "	4+/7	57%
Bakouroufata	" " "	0+/9	0%
Beretekounda	" " "	6+/21	29%
Tantoudji	" " "	0+/11	0%
Moussagouya	" " "	0+/12	0%
Mamadouya	" " "	1+/11	9%

Table 6 IMPLEMENTATION SCHEDULE PLANNING ACTIVITIES

ACTIVITIES	PROJECT QUARTERS							
	I	II	III	IV	V	VI	VII	VIII
1. Installation	X							
2. Initial country visits		X						
3. First planning committee meeting			X					
4. Field work			X	X				
5. Second committee draft master plan and PID submitted					X			
6. M.P. & PID revised					X	X	X	
7. Revised M.P. & PID approved							X	
8. Negotiation with potential donors begin							X	
9. Preliminary donor commitments obtained								X
10. Final meeting of the planning committee to define future joint planning modalities								X

Table 7

PROVISION OF TECHNICAL ASSISTANCE

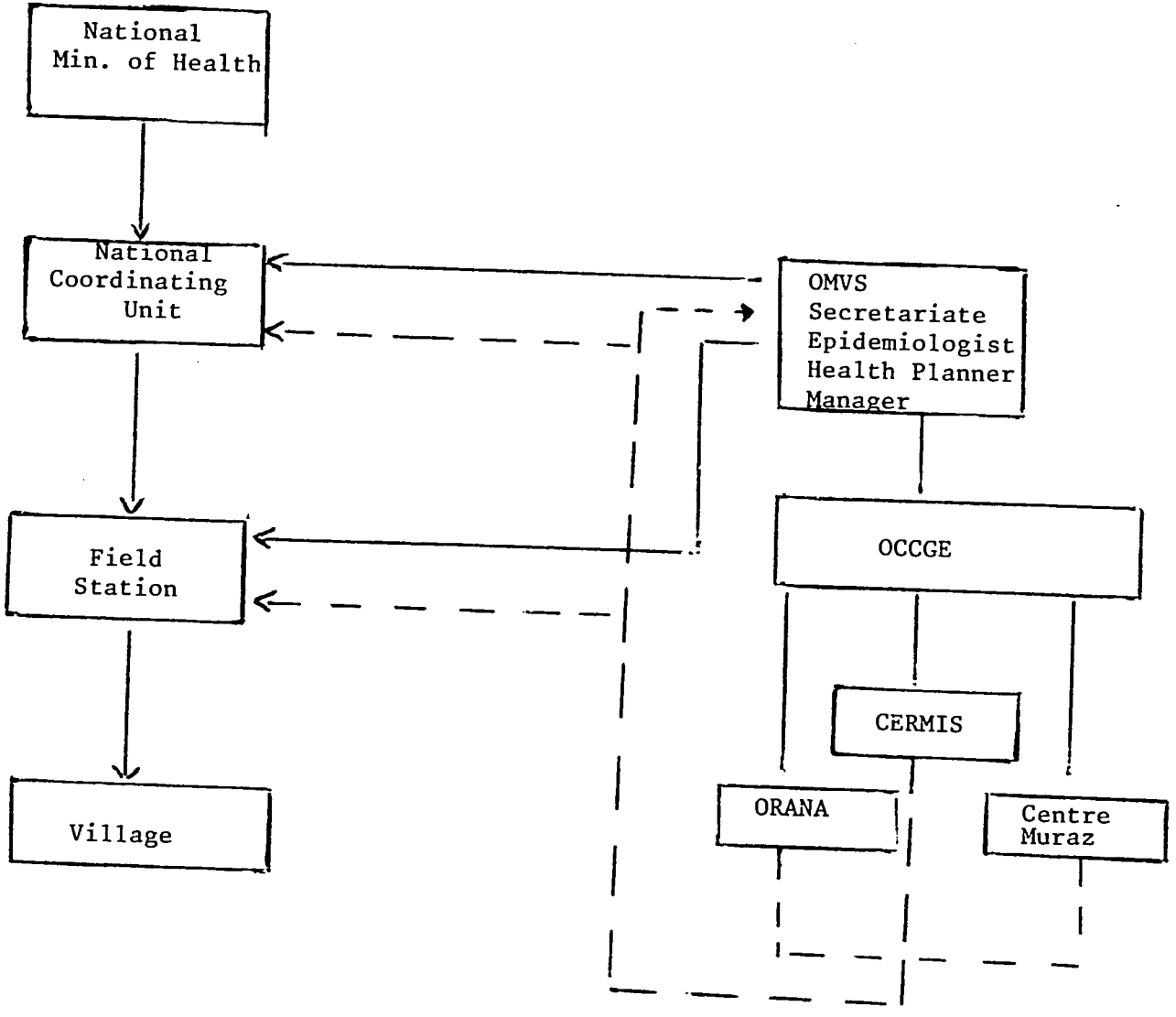
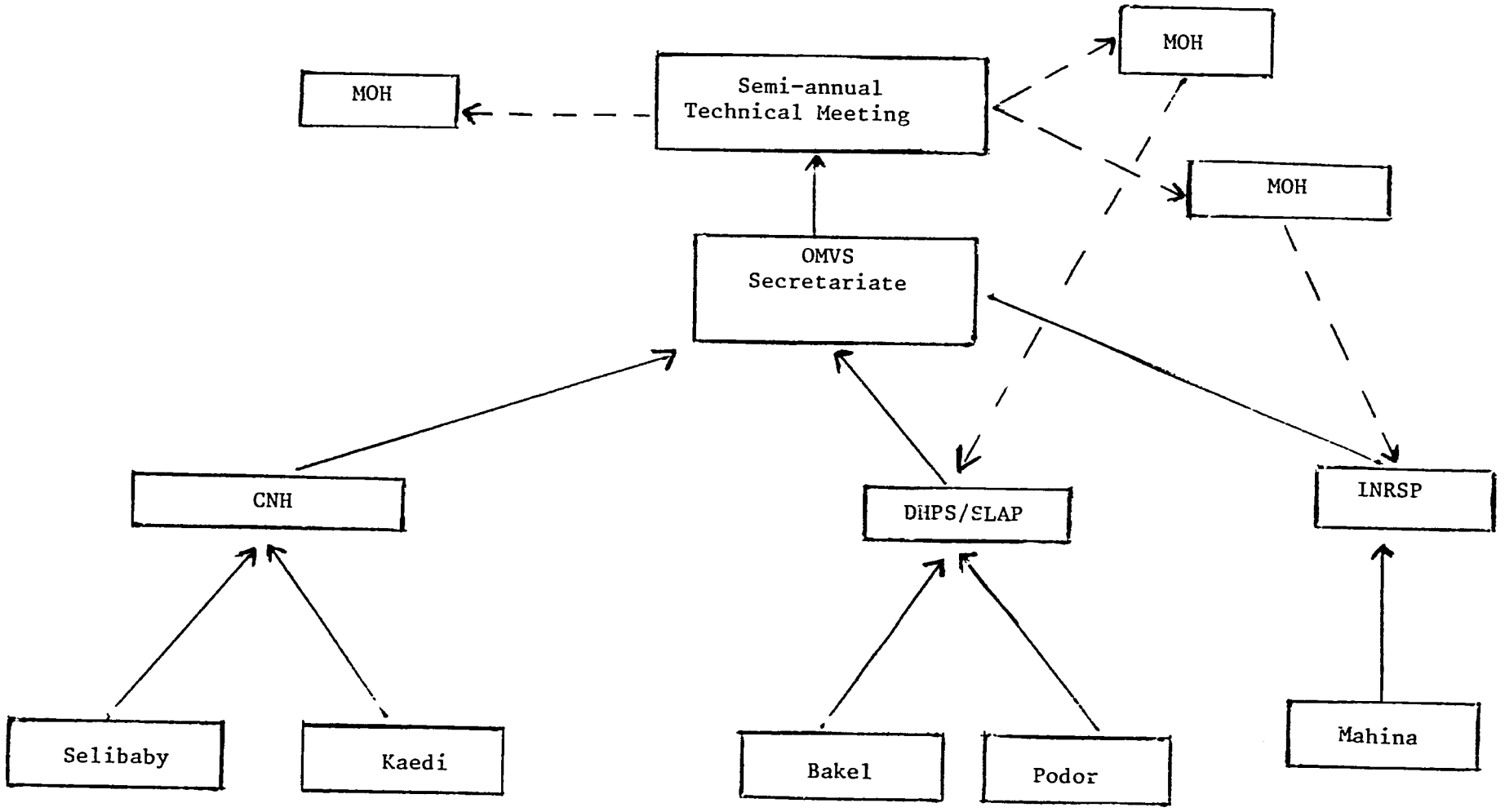


Table 8

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