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PROJECT PAPER

MALI

MANANTALI RESETTLEMENT

(625-0955)

AGENCY FOR INTERNATIONAL DEVELOPMENT

August 13, 1984

UNCLASSIFIED

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5. PROJECT NUMBER (7 digits) 625-0955	6. BUREAU/OFFICE A. SYMBOL B. CODE USAID/Bamako 688	7. PROJECT TITLE (Maximum 40 characters) Manantali Resettlement Project
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8. ESTIMATED FY OF PROJECT COMPLETION FY 89	9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY 84 B. QUARTER 4 C. FINAL FY 86 (Enter 1, 2, 3, or 4)
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10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -						
A. FUNDING SOURCE	1st FY of Full Implementation (FY85)			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	1424	11798	13222	4512	13823	
(GRANT)	(1424)	(11798)	(13222)	(4512)	(13823)	(18335)
(LOAN)						
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		199	199			2966
OTHER DONOR(S)						5480
TOTALS						26,582

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 84		H. 2ND FY 85		K. 3RD FY 86	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1)	930								
(2)									
(3)									
(4)									
TOTALS				13589		2923		1823	

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED MM YY 09 86
	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN		
(1)							
(2)							
(3)							
(4)							
TOTALS	0				18335		

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 = NO
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SIGNATURE <i>[Signature]</i>			
TITLE Director, USAID/Mali	DATE SIGNED MM DD YY 08 13 84	MM DD YY 	

MANANTALI RESETTLEMENT PROJECT

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INTRODUCTION

This project paper presents the design for the Manantali population resettlement in three parts.

The first part (Section 1) provides a concise summary of what the project is all about.

The second part (Sections 2 through 6) attempts to satisfy the needs of both reviewers and implementers. These sections provide the background to the project and lay out the plan for accomplishing the project purpose. It is intended to contain enough detail to allow review committees to make informed judgments about the project plan as well as to furnish implementers with the precise kind of information necessary to carry out the activities.

The third part consists of Sections 7 and 8.

Section 7 contains all the analyses done or used by the design team to lay out a plan for this rather complicated project. In these analyses the reader will find discussion of various alternative activities, including schedules.

Section 8 contains number of important attachments including the draft project authorization, the vehicle waiver request, the log frame, the statutory checklist, and the 611 (a) certification.

The project designers have generally followed Handbook 3 and recent cables providing instructions for project paper form. However, some light deviations were made in the belief that the presentation of the resettlement plan would be more easily understood by the reader.

USAID/Bamako expresses its appreciation for the service and support it has received from USAID/REDSO/WCA, particularly the engineering staff, in the design effort. It wishes also to acknowledge the collaboration and contributions of UNDP/Bamako and the Malian Government unit which has thus far overseen the preparation for the project.

All cost estimates are based on an assumed exchange rate of \$1 = 375 Francs CFA.

1.0 SUMMARY

1.1 PROJECT GOAL

To help the government of Mali move 11,000 people out of the area which will flood behind the Manantali Dam beginning in July 1987.

1.2 PURPOSE

To resettle the people who will be forced to move--minimizing their hardship and seeking to at least sustain their current level of living-- in the most efficient and cost effective manner.

1.3 SUMMARY DESCRIPTION

The Malian Government with help from USAID will relocate, resettle, and compensate the 11,000 inhabitants (about 1000 households) in 30 villages and 18 farming hamlets of the Bafing River Valley who now reside in the area which will become Lake Manantali. Project assistance will include funding to create a temporary Resettlement Project Unit (RPU); provide a team of four long-term (36 months each--or less) technical experts, a Personal Services Contract Project Administrator, and various short-term technical assistance; contract essential support personnel for specific tasks over fixed periods; construct basic offices and housing for project personnel; cut tracks to and clear new village sites; sink wells at the new sites; train villagers in pump maintenance; construct minimal village administrative and support infrastructure to replace what will be lost; rebuild village housing; distribute building materials for other family and village structures; conduct an epidemiological/nutritional and an archaeological survey; monitor the execution and timing of project activities; distribute World Food Program commodities; offer limited support to the maintenance of public health; and move people and their belongings to the new sites.

1.4 TIMING/DURATION

The project proper will begin in August 1984. All major activities will be completed by September 1988. Funding for food distribution will continue through June 1989.

1.5 SUMMARY COST

The project is estimated to cost \$27,179,000. Of this amount, \$18,335,000 will be a grant to the government of Mali by the U.S.; an estimated \$3,364,000 will be the direct and indirect contribution of the Malian government; and \$5,480,000 is the value of the commodities to be furnished by the World Food Program.

1.6 SUMMARY USAID FINANCIAL PLAN (\$000)

	FY84	FY85	FY86	FY87	FY88	TOTAL
Construction	61	10096	0	0	0	10157
Commodities	79	554	51	0	0	684
RPU Op/Expenses	26	362	483	475	279	1625
Technical Assistance		1430	1299	1216	281	4226
Compensation	28	0	249	0	0	277
Monitoring/Studies	-	780	138	54	0	972
Evaluation Costs	-	-	193	0	201	394
TOTALS	194	13222	2413	1745	761	18335

1.7 INPUT/OUTPUT SUMMARY

INPUTS (\$000)

USAID GRANT: \$18335

Construction \$10157

OUTPUTS

Offices for Resettlement Project Unit (RPU)

Lodging for senior civil servants and expatriate technical assistance personnel on RPU staff

8 warehouses

45 pump-equipped borehole/cistern combination wells and 53 pump-equipped drilled boreholes

200 kilometers rural tracks

5500 hectares cleared for new village sites and fields

5000 mud block houses built, materials provided for construction of 3000 granaries, 1000 latrines, 450 cookhouses, 650 chicken pens, 300 livestock shelters, 1000 concession walls

A maternity clinic, dispensary, pharmacy, primary school, veterinary post, forestry post, health support post, administrative offices, transit house, and four improved dwellings

Commodities \$684	RPU offices and lodgings equipped, means of transport provided for supervision and monitoring of project activities
Op Expenses \$1625	RPU control and monitoring of project activities, continuous on-site project representation, involvement of settlers (beneficiaries) in planning and execution, World Food Program provisions distributed
Tech Assistance \$4226	Management and contracting help, financial accountability of expenditure of all project funds, operational planning, verification of achievement of technical specifications of construction work, inventory control
Compensation \$277	People compensated for loss of fruit orchards, improved housing, water points
Monitoring, Studies and Special Activities \$972	Baseline data on epidemiological and nutritional status of settlers, survey of archeological sites, limits of reservoir marked, tree nursery set up, Master Settler List, pump training, compensation verification, health contingency, farm (soils) contingency
Evaluation \$394	Mid-term and final assessments of project progress and achievements
GRM INPUTS	OUTPUTS
Sites \$140	30 villages and 18 hamlets relocated out of reservoir area
Personnel \$250	Preparation of technical documents and activities plans, coordination with dam contractor, settler involvement, control of construction, World Food Program commodities distributed, people moved before flooding
SETTLER INPUTS	OUTPUTS
Labor \$2400	1000 concession rebuilt and new fields established
WF PROGRAM INPUTS	OUTPUTS
Foodstuffs \$5500	Nutritional security of 11000 settlers during period of stress caused by resettlement
1.8 BENEFICIARIES	

The 11,000 people who will be relocated will be the main beneficiaries of the project. The government of Mali and the Senegal River Basin Development Organization (OMVS) will benefit by having people resettled in a timely fashion which will retard neither the construction schedule nor the impoundment of the artificial lake in the reservoir behind the dam. The project will generate employment for people, both settlers and non-settlers, who will be paid to help execute the activities.

1.9 IMPLEMENTING AGENCY

The temporary Manantali Resettlement Project Division (RPU) will be an agency attached to the National Hydrological Service (Direction Nationale du Service de l'Hydraulique et de l'Energie (DNHE)). This service is a division within the Ministry of Equipment (Ministère d'Etat Chargé de l'Equipement) which is also the coordinating organization for all Sénégal River Basin development activities in Mali. The role of the RPU will be to plan, coordinate, contract for, and monitor the execution of all project activities; to coordinate the resettlement effort with the OMVS, and to ensure the participation of the beneficiary population in the project.

1.10 WAIVERS REQUIRED

An unconditional waiver of the source and origin requirement of Section 636 (i) of the amended FAA of 1961 is requested to permit procurement of eight all-terrain vehicles, twenty motorbikes, and three trucks.

1.11 CONDITIONS PRECEDENTS/COVENANTS

In addition to the standard provisions of the project agreement between the governments of Mali and the United States, the Malian government will be asked to furnish, in a form and substance which satisfies USAID regulations and before any disbursements of funds or the issuance of any commitment documents, evidence that:

a) a Resettlement Project Division (RPU) to manage the population transfer has been officially established and its responsibilities and authorities defined.

b) a Manantali Resettlement Project Director familiar with the planning of the resettlement activities has been officially appointed.

c) other personnel as listed in the project agreement have been officially assigned to the Resettlement Project Unit.

In addition, the government of Mali will covenant the following:

a) a financial management and accounting system, including

inventory control, which satisfies USAID regulations will be established in the Resettlement Project Unit;

b) Private sector firms will execute all project construction and other activities unless otherwise jointly agreed by the GRM and USAID; and

c) Appropriate ministries will fully staff the village infrastructural facilities to be built.

d) proper maintenance of wells, tracks, and other infrastructure facilities built with project funds will be assured.

1.12 CONTRACTING PREFERENCE/MODE

Proposals from small or minority firms will receive sole consideration for the institutional contract to furnish a Manantali-based technical assistance team to the Malian government Resettlement Project Unit. This assistance will be procured by means of a direct AID contract. A Project Administrator will be engaged under a direct AID Personal Services Contract. A construction specialist will also be hired for the first year of the project under a direct Personal Service contract. All other services and commodities required to execute the project will be procured by the RFU by host country contract or inter-agency agreement subject to approval by USAID.

1.13 PROJECT DESIGN TEAM

The following individuals contributed to the project design at various times during the process:

Glenn Anders, Agricultural Engineer, USAID/REDSO/WCA

Jon Anderson, Forestry and Energy Advisor, USAID/Bamako

Susan Buchanan, Architectural Engineer, USAID/Bamako

Gerald Cashion, Design/Evaluation Officer, USAID/Bamako

Hamaciré Daou, Civil Engineer, USAID/Bamako

Allan Dean, Project Design Consultant, Ronco Associates

Robert Dembélé, Civil Engineer, Mali National Hydrology Service

Djibril Diallo, Civil Engineer, Mali National Hydrology Service

David Hess, former Social Science Advisor, USAID/REDSO/WCA

Dan Jenkins, Agricultural Engineer, USAID/REDSO/WCA

Marcel Juton, Consulting Engineer, UNDP/Bamako

Peter Knebel, Health Advisor, USAID/SDPT (Bamako)

Dolores Koenig, Anthropologist, Institute for Development
Anthropology, SUNY Binghamton

Yacouba Konaté, Rural Sociologist, Mali National Hydrology
Service

Lewis Lucke, Assistant River Basin Development Officer,
USAID/Dakar

Diana McLean, Agronomist, USAID/REDSO/WCA

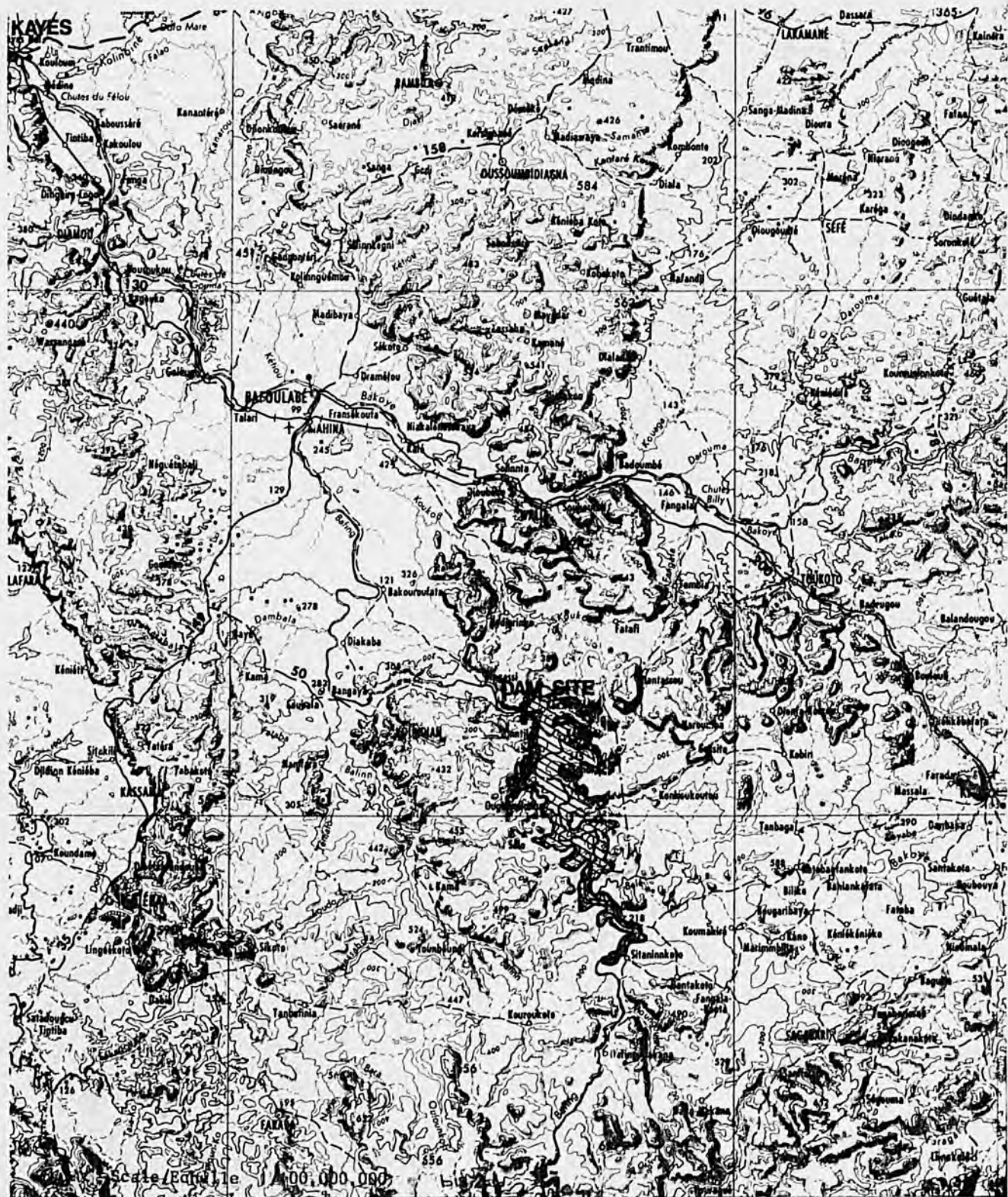
S.K. Reddy, Agronomist, USAID/Mali

Emmy Simmons, Agricultural Economist, USAID/SDPT (Bamako)

MAP/CARTE 1:

Limit of reservoir

Limite de la retenue



2.0 PROJECT RATIONALE AND DESCRIPTION

2.1 OMVS BACKGROUND

The Sénégal River Basin Development Organization (OMVS) was established in March 1972 by the presidents of Mali, Sénégal, and Mauritania. Successor to two older agencies, its function was the same: to promote and coordinate the research, planning, fundraising, and development of the river basin. Its main goal was to bring the waters of the Sénégal River and its tributaries under control. To accomplish this, the construction of two dams, their sites long ago identified and proposed (Diamé and Manantali), was foreseen.

In the 1970s, USAID assisted the OMVS by investing \$17 million to analyze the hydro-agricultural potential of the basin; identify the environmental effects of dam construction; map the entire basin through aerial surveys; and compile a mass of socioeconomic data on the basin and its people. These activities proved to be influential in the decisions of other donors to contribute to the river basin development program.

By late 1981 \$800 million had been donor pledged to help the OMVS achieve its infrastructural goals, including the two dams and construction of river ports between St. Louis, Sénégal, and Kayes, Mali.

Of the two dams, the one at Manantali is the most important. Located 90 kilometers southeast of Bafoulabé in Mali's First Region, the dam will be 66 meters high and stretch for a mile between two mountainsides in the river valley. It will impound and serve as principal control of the flow of the Bafing. It will permit creation of a reservoir containing eleven billion cubic meters of water which, released through the dry season, will regulate a river flow of 300 m³/second. Control of the flood will generate an irrigation potential of 375,000 hectares and thus decrease farm family dependence on unreliable rainfall and the risk of crop failure. The controlled flood will also provide landlocked Mali with year-round access to the sea over the river from Kayes to St. Louis. Further, the dam will be capable of producing up to one billion kilowatt hours of electricity per year. As this power becomes available it will be utilized to exploit the basin's mineral resources and serve small industry.

Manantali construction activities started in October 1981 with the beginning of the access road from the railhead at Mahina to the dam site. By July 1981, the road was complete, railroad facilities had been upgraded to handle the influx of equipment and supplies, and the dam contractor had begun work. At this writing (November 1983), work is on schedule, the impoundment in the reservoir will begin in July 1987 and the dam itself will be completed in May 1988. By that time, the people in that area must be resettled.

2.2 AID COMMITMENT

Over several months in early and mid-1979, extensive discussions were held in AID/Washington to determine what U.S. support to the OMVS development might consist of. In light of the policy directives governing U.S. assistance at that time, it was concluded that AID could not contribute to the construction of the dams. However, it was decided that support of a resettlement program represented the most logical and timely opportunity for AID participation in the OMVS program. Further, it was decided that AID would participate fully with other donors in the downstream program -- as formulated by the OMVS and its member states. In October 16, 1979 a message was cabled to USAID/Dakar instructing the Mission to inform the OMVS High Commission of the AID/Washington decisions. In addition, the Mission was instructed to proceed to identify AID's role in the resettlement activity that would be required by the construction of the dam at Manantali in Mali (See 79 State 269812).

2.3 OTHER DONOR COMMITMENT/COORDINATION

The OMVS High Commission has solicited and received pledges of almost \$800,000,000 to finance the infrastructure development. For Manantali specifically, the following list indicates donor pledges (in millions of dollars):

Saudia Arabia	125
Federal Republic of Germany	87
Kuwait	84
European Economic Community	77
Abu Dhabi	57
African Development Bank	39
Italy	35
Canada	21
Islamic Development Bank	20
Iraq	20
France	5
UNDP	3

In addition, the West German Bank, the Kreditanstalt fur Wiederaufbau (KFW), has pledged about \$8 million (20 million DM) for the deforestation of the reservoir and the World Food Program has pledged \$5.5 million in food commodities to be distributed over three years to the population which must be moved out of the reservoir area. USAID's \$10 million pledge for relocating these people was made in 1979 when the project costs were not known.

AID/Bamako has sought to coordinate its resettlement planning with the World Food Program (WFP) representatives and those of KFW for the deforestation activity. Both AID and the GRM have had regular contact with WFP for joint planning purposes and results have been very satisfactory for all. Coordination attempts with the deforestation activity have been less productive mainly because the KFW planning is far less advanced than AID's at this point. KFW had commissioned a Hamburg consulting firm (Bureau

Atlanta) to put together a plan and cost estimate for the deforestation. The result, submitted for GRM and KFW approval in July 1983, proved much too costly. KFW is now studying cheaper alternatives but has not yet formulated a plan. Thus, the USAID/GRM desire to coordinate work, particularly on track improvements and land clearing has not to date been successful. Nonetheless, once the KFW plan has been put together, coordination of activities to avoid duplication or reduce costs will be pursued.

The project designers have also sought to coordinate the resettlement activity planning with the International Development Association-funded projects in rural water supply and health care systems proposed for the administrative circles of Kita, Bafoulabé, and Kéniéba. The health infrastructure planned for New Bamafélé, described below, is similar to what will be financed by the IDA in several First Region administrative towns. The water supply component planned for the resettlement project studied several kinds of interventions in the realm of rural water provision, both in Mali and elsewhere, and including the IDA scheme. While it proved impossible to include any of the resettlement activities under the IDA project, or vice versa, every effort was taken to make the USAID and IDA projects complementary rather than duplicative or competitive.

USAID has also had continuous contact with representatives of the DMVS, the general contractor for the dam construction (Enterprise for the Construction of the Barrage at Manantali--ECBM), and the firm of control engineers (Groupement Manantali). Regular meetings with officials of these organizations have assisted AID and the GRM in planning staff offices and housing, provided updates on the timing and execution of the dam construction, and resulted in tentative agreement by ECBM to furnish water, electricity, and vehicle fuel, as well as vehicle and house maintenance services to the RPU.

2.4 RELEVANT EXPERIENCE

Over the past thirty years there have been many instances of involuntary or forced resettlement caused by the filling of reservoirs behind dams built for flood control or the generation of electric power. Two worldwide assessments of resettlement experience have been published in the last three years, the first by Oliver-Smith and Hansen, the second by Thayer Scudder et al. * The latter was research facilitated through a cooperative agreement financed in part by the Office of Multisectoral Development in AID's Bureau for Science and Technology (Grant No. DSAN-G-0140). These two studies conclude that the results of most resettlement efforts have been unsatisfactory, for various reasons. They underscore the importance of

-- the need for careful and detailed resettlement planning;

-- the need for comprehensive multidisciplinary research on potential sites, the resettling peoples, the host populations,

and the variety of procedures and alternatives available for the execution of the transfer;

-- the severity of the physical, psychological, and social stress suffered by the settlers;

-- avoiding the introduction of any new or innovative economic activity, particularly in crop or livestock production, until at least two years after the transfer has been accomplished;

-- the economic loss that women have generally incurred in resettlement projects;

-- maintaining existing ethnic boundaries;

-- involving the settlers in the planning and implementation of the move to the maximum extent feasible;

-- respecting the cultural beliefs and practices which tie settlers to their old and new dwelling sites;

-- the need for continuous monitoring of all the activities which constitute the resettlement effort.

Several examples of resettlement in Africa include those at Aswan in Egypt, on the Volta River in Ghana, the Kainji in Nigeria, and the Kariba in Zambia. The Kariba experience has been the subject of twenty-five years of research conducted by Thayer Scudder and Elizabeth Colson with their associates and students. More recent and relevant to planning the Manantali population relocation are the two undertaken within the past decade -- one at Kossou in the Ivory Coast, the other at Sélingué in Mali just one hundred kilometers south of the capital Bamako. These two efforts were quite different in conception and in execution.

At Kossou, the Ivorian government viewed the population resettlement as an opportunity to undertake integrated development. About 100,000 people were to be affected by the rising water of the Kossou reservoir of which some 76,000 had to be relocated. This was accomplished over four years in the early 1970s. Seeking to bring the settlers into the modern economy, the government built 11,800 modern housing units for them -- nine different types from one to seven rooms in size. It amalgamated the settlers into 74 large towns, built 74 schools, drilled 300 wells, and constructed 59 produce warehouses. It sought to modernize agricultural production by introducing mechanized techniques and selected seed varieties, and by providing farmers with extension services and credit for equipment and inputs. Many farmers were trained in fishing techniques in an attempt to convert them from agriculture and exploit the reservoir. The development agency built 246 kilometers of rural access roads. It undertook health care for the entire population, devoting particular effort to an attack on endemic diseases. The government did several different kinds of studies and surveys to amass the information thought necessary to successfully implement

the integrated development.

The relocation was relatively well planned, well financed, and well executed. The plan was impressive. But today expectations go unfulfilled. The people who were moved and seemingly provided with so many advantages for betterment now complain of inappropriate housing, insufficient indemnities for losses incurred, the attribution of cropland unsuitable for cultivation or too small in area to support their families, and the fact that daily life remains a battle for survival. Perhaps the largest error committed in this development effort was the failure to involve the settlers in the planning of their future. What resulted was an attempt to impose a model from the exterior and this failed.

At Sélingué, the resettlement of the people was also less than fully successful, for different reasons. It suffered mainly from inadequate planning and an insufficient amount of money to do the resettlement right. Specific problems identified after the fact included a lack of time to rebuild the villages, provide water, clear cropland, and move the people. As the season approached when the reservoir was scheduled to begin to fill, a crash effort had to be mounted to accomplish the move. Local chapters of the Malian National Youth Association were recruited to make bricks and construct housing. Because of the rush, the bricks and the houses were poorly done. Boreholes were drilled to provide water at the new sites. Some of these were equipped with pumps, but few of them operated. Many were never even equipped. Access both to the existing villages and the new sites proved to be critically important. At a late hour, emergency funding had to be sought to construct a fifty-kilometer-long route on the left bank of the river south of the dam site so that people in that area could be reached and moved. Some villages at the south end of the reservoir were hard to reach and their inhabitants were simply given money and told to move. Nor did the compensation they received cover their losses. The same can be said of those people who had productive orchards or improved housing or wells. Although resettlement authorities had foreseen indemnifying people for such losses, it just did not have the funds to do so. Further, the hasty clearcutting that took place at the new village sites removed all trees, productive and non-productive alike. Some villages had no project help to clear new fields and farmers in these did no crop cultivation the year of the transfer. No provision was made to compensate villagers for the loss of public building like mosques. No accurate census or master list of people to be relocated was done. Thus, some villagers claimed that the produce distributed by the World Food Program was insufficient in quantity.

The settlers were not involved in the little planning that took place for there was not time nor any structure by which to do so. They were not informed about the changes their lives would undergo. Thus, when the influx of construction workers -- Malian, African and European expatriates -- arrived, local youth, male and female, acquired a number of new habits. They were introduced

to alcohol, drugs, and prostitution. When temporary employment on the dam site ended young men took up robbery to sustain their new tastes. When the construction workers moved on, young women migrated to the capital to sell their services. Family structures were thus altered in ways that had not been foreseen by the settler population. Educating people about what might be brought by the construction could have aided them to withstand some of the negative forces at work, but this had not been possible given the time constraints faced by the authorities.

One additional problem might be noted that bears upon the Manantali planning. This is that fact that no survey or identification of important archaeological sites was undertaken. When the floodwaters rose behind the dam, a village was flooded that according to oral tradition had once been the site of the capital of the Mali Empire. This village, Niani, was located on the left bank of the river, that is, on the Guinean side of the frontier. Guinea protested this at the United Nations and sought to force the opening of the spillways to decrease the water level at Niani. International arbitration was required to settle the dispute. At this time, Mali has temporarily agreed to regulate the maximum level of the reservoir at an elevation lower than had been planned so as to preserve this village.

In spite of the problems that arose, much credit is due the government resettlement authorities for accomplishing the population transfer in the little time they had. Moreover, recognizing that much remains to be done, the government is continuing to focus attention on the area around Sélingué. The development of necessary infrastructure and the increase in the provision of services goes forward. A large irrigated rice perimeter under construction just downstream of the dam site will provide economic opportunity for the settlers in the future. Access to markets and services is enhanced by the road that was built to the dam construction site. Although it is clear that the Sélingué population did not benefit as it might have and no doubt suffered certain losses as a result of the resettlement, the Malian government is determined that the Manantali relocation effort will profit from the Sélingué experience. It will be better planned and executed.

2.5 AID STRATEGY

The USAID strategy to accomplish the project purposes -- to relocate the people with the least disruption possible in their standard of living -- will be twofold: to minimize the management burden on the Mission and the GRM resettlement unit and to maximize the involvement of the population in the planning and execution of the transfer in the most cost effective manner.

The Mission will employ the direct AID contracting method for the technical assistance and the host country means for main project activities -- the development of wells, track improvements, clearing land and construction of buildings. Technical assistance will be attached to the GRM resettlement

unit and will perform essentially in an advisory role to aid the GRM personnel to oversee and control contract work. Besides these important tasks, the resettlement project unit (RPU) will be charged with planning and coordinating all project activities -- with the OMVS, the dam contractor, the deforestation unit, the resettlement project contractors, and the settlers -- and the reception and distribution of the World Food Program commodities.

The GRM resettlement project unit will be temporary. There will be no long-term recurrent costs. Senior Malian personnel will be civil servants assigned from the National Hydrological Service -- the agency responsible for undertaking the population resettlement -- or seconded from other agencies only for the duration of the project. Support personnel -- accountants, technicians, community development agents, secretaries, drivers, warehousemen, guards --- will be contracted by the RPU for specific duties of fixed duration.

The RPU will involve the settlers by creating several committees: one will be project wide composed of delegates from each village to be moved, along with project, local GRM administration, OMVS, USAID, and contractor representation; the other committee will a local one created in each village to be moved and made up of traditional village authorities, mainly family heads. A third committee will be formed for village women, to assure that their needs are fully incorporated into the planning. A female sociologist, assigned to the RPU will organize this group and lead its discussions.

2.6 ALTERNATIVES CONSIDERED

To achieve the project purpose with the strategy just described, a number of different possibilities were examined.

Simply providing some sort of just cash compensation to each settler family and asking it to pack up and move by a particular date would be by far the cheapest and the easiest alternative. Indeed, this was done with some of the villages located at the southern end of the Selingue reservoir. Access to these was difficult. Confronting a severe time constraint, project management had no choice but to proceed as such. Three factors influenced rejection of this option. First, families so compensated in the Selingue resettlement effort came out the worst off. They had little to show for the cash -- a result common to this intervention according to the literature on resettlement experience (Hansen and Oliver-Smith). The money was spent on things other than reestablishing their households and fields.

Second field inquiry in every village to be moved because of the Manantali construction presented the total compensation option to the villagers. In every village but one, people voiced their opposition to this. Recognizing the magnitude of the job, villagers stated the preference of receiving project technical and material assistance to help them accomplish the transfer.

Third, initial discussions with the GRM indicated that such an unplanned, uncoordinated population relocation could well require last minute emergency intervention by the government and would likely be detrimental to the future development of the Bafing Valley.

A second alternative considered was that of doing it all for the settlers. The project would contract to reconstruct entire villages in existing structure, form, and spatial patterns. This option would be the most likely to ensure that sites would be prepared and new dwellings built and ready to be occupied before the reservoir begins to fill. However, it would also be the most expensive alternative and offer the least involvement to the population. Further, it might generate an undesirable mentality -- that of expecting the government to do everything -- and result in the population sitting on its hands waiting for development, and gifts, to arrive.

The third possibility given serious consideration was that of just providing materials with which people might rebuild their villages. This would ease the burden of physical labor required -- to amass soil for blockmaking, to haul water, to form the blocks, to cut and gather bamboo and straw for roofing. Yet this option would still demand access to water for construction and be very slow and highly uncertain with no overall coordination. Since the water table at the potential resettlement sites is relatively deep, hand-dug wells were not viewed as appropriate. Therefore, the project would have to provide wells. Moreover, the project would have to build some facility to stock and store the materials. The problem of access to the new sites remained. So did that of clearing new fields for crop cultivation -- a major impediment to success in the Selingue experience. Finally, it was seen that even if the new villages could be built by the settlers themselves the actual transfer would still have to be accomplished. In some cases this would entail moving people and belongings over fairly long distances. The RPU would no doubt have to assist. Given all these factors, simply providing construction materials was not judged as an appropriate option.

The alternative ultimately adopted as the best available is in fact a combination of those discussed above. The objective is to keep the amount of physical labor required of settlers at a reasonable level while at the same time asking people to participate in both the planning and execution, including village reconstruction of the relocation. Thus, the RPU will contract (with the exception of the technical assistance) for services and materials to clear new village sites and cultivated fields; to provide access tracks, water points, warehousing, and replacement social and administrative infrastructure; to train villagers in pump maintenance and assist with the reconstruction of their homes; to transport people and their possessions to the new villages; to transport World Food Program commodities; and to build the offices and lodgings needed by project staff. At the same time, the RPU will request villagers to assist with the reconstruction of their sleeping quarters. Villagers will be

provided with materials to build granaries, latrines, corrals, chicken houses, compound walls, garden fences, mosques, and market places, but will be required to do the actual building. The project will clear brush and large, non-productive trees from new fields but farmers will be expected to do whatever is necessary for planting new fields in traditional ways.

This alternative, incorporating collaborative effort and shared responsibilities, is viewed as the one most feasible and just, as well as the one most likely to be successfully achieved.

2.7 PRE-PROJECT ACCOMPLISHMENTS

Through the assistance of \$300,000 from the UNDP and the efforts of the government of Mali, much has been achieved in preparation for the resettlement activity. This has enabled planning to move forward.

A study done by the "Groupement Manantali" in 1977 provided a large amount of basic information about the people who must be moved, potential areas for resettlement, and the tasks necessary to effect the transfer.

Beginning in late 1981 and continuing to the present, the GRM and USAID have undertaken several missions to verify or update much of this data. These missions also identified a number of gaps in the information that were necessary to fill before the resettlement itself could begin. Moreover, they served the important purpose of establishing lines of communication between project planners and the beneficiaries. The necessity for the population transfer was explained and alternative possibilities for accomplishing the move were outlined.

Various resettlement sites were identified. Their advantages and disadvantages were discussed with the settler population. Some sites were already peopled so the potential host population had to be brought into the discussions. Village notables visited the sites and tentative decisions were made by the settlers about who would move to where and with whom.

Following these tentative decisions, the UNDP money financed studies of the soils and hydrogeology at the potential sites. The first phase of the pedological study was done at a 1:50,000 scale in dry season 1983. The second phase was done at a 1:20,000 scale at those areas judged to be particularly favorable for crop cultivation. Once the results of phase one were in, potential resettlement sites were confirmed.

The hydrogeological study included the drilling of twenty-four test wells, of which twenty proved able to provide an adequate supply of water, thus further confirming the viability of the sites.

The Institute of Rural Economy (I.E.R.) conducted an extensive

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socioeconomic survey, also financed by UNDP, among both settler and host populations. This included updating 1976 census data doing an inventory of all physical structures that would have to be rebuilt, determining acreage cultivated, arriving at numbers of livestock, identifying village decision-making processes, and so on.

The results of the studies were aired with the settlers. The various options for executing the resettlement were once again discussed with settlers, local administrative authorities, and local politicians on several occasions in late 1982 and early 1983. In July-1983 at a meeting held at the local administrative seat, presided over by the local administrative official and attended by representatives of all villages affected by the dam construction and population resettlement, firm decisions were made on new village locations. These decisions were recorded by the administration and, together with the study and survey results, have formed the basis for the resettlement plan laid out in this project paper. Site planning has thus proceeded in spite of the reluctance of a few villages to adhere to their stated choices.

UNDP funding also enabled the government to set up a Resettlement project Unit attached to the National Hydrological Service. This was done in early 1983 so that the studies also financed by UNDP could be coordinated and monitored.

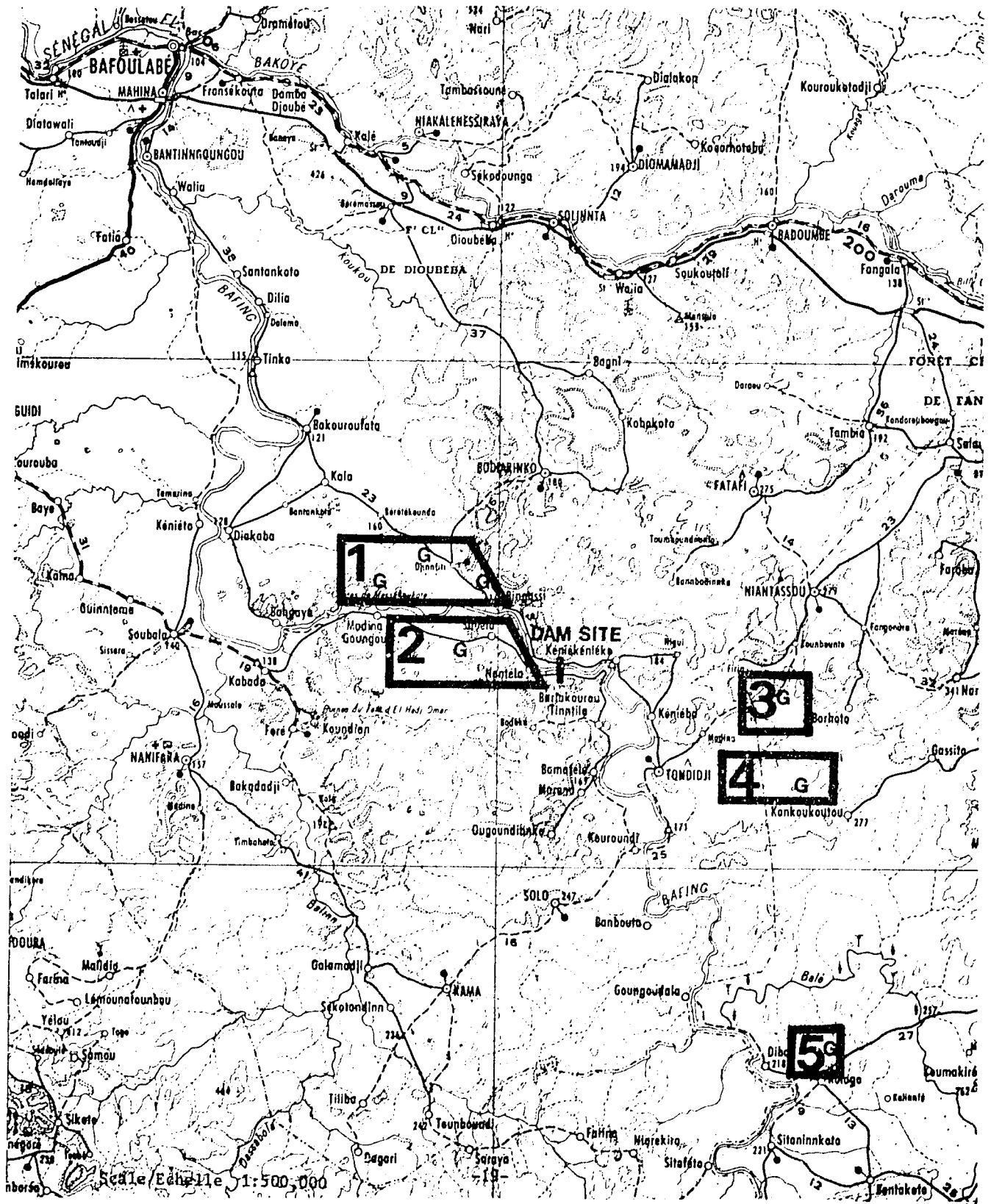
Further, aerial photos of all existing villages have been taken so that they might be reconstructed in a manner resembling the current spatial arrangements, should the inhabitants so desire. This was done by the French National Geographic Institute, again financed by UNDP funds.

In addition, the GRM National Office of Cartography and Topography has begun a topographical study of all the provisional sites. This will be used plan the layout of the new villages.

Beyond these solid accomplishments, the RPU and the Mission have continued the planning process and have performed all of the analyses necessary to formulate the project design. Five resettlement zones have been designated into which 30 villages and 18 hamlets will be relocated. Seven loosely amalgamated groups will be formed, three of which will be in Zone I in recognition of the advantages to be derived from proximity to the new access road.

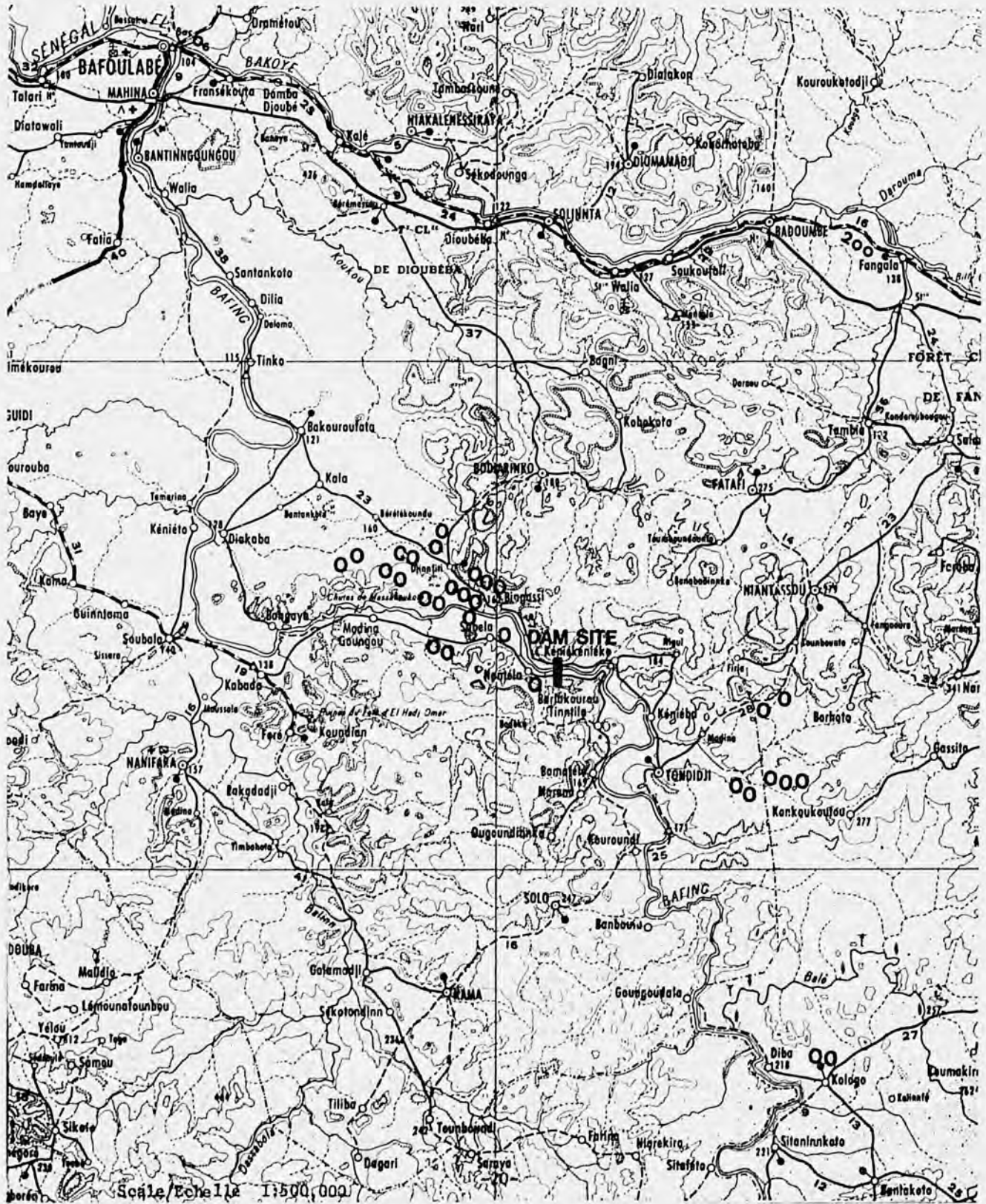
These pre-project achievements have laid the foundation for the transition to implementation.

MAP/CARTE 2: Proposed Resettlement Zones and Village Groups (G)/
Zones de Recasement Proposées et Groupements de Villages (G)



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MAP/CARTE 3: Proposed Village Sites/
Sites des Villages Proposés



2.8 PLANNED PROJECT ACTIVITIES

The activities laid out below are briefly described to inform the reader about what must be undertaken to properly effect the population resettlement. They are set forth in approximate chronological order.

2.8.1 ADDITIONAL PLANNING AND PREPARATORY ACTIVITIES

2.8.1.1 ESTABLISHMENT OF RESETTLEMENT PROJECT UNIT (RPU)

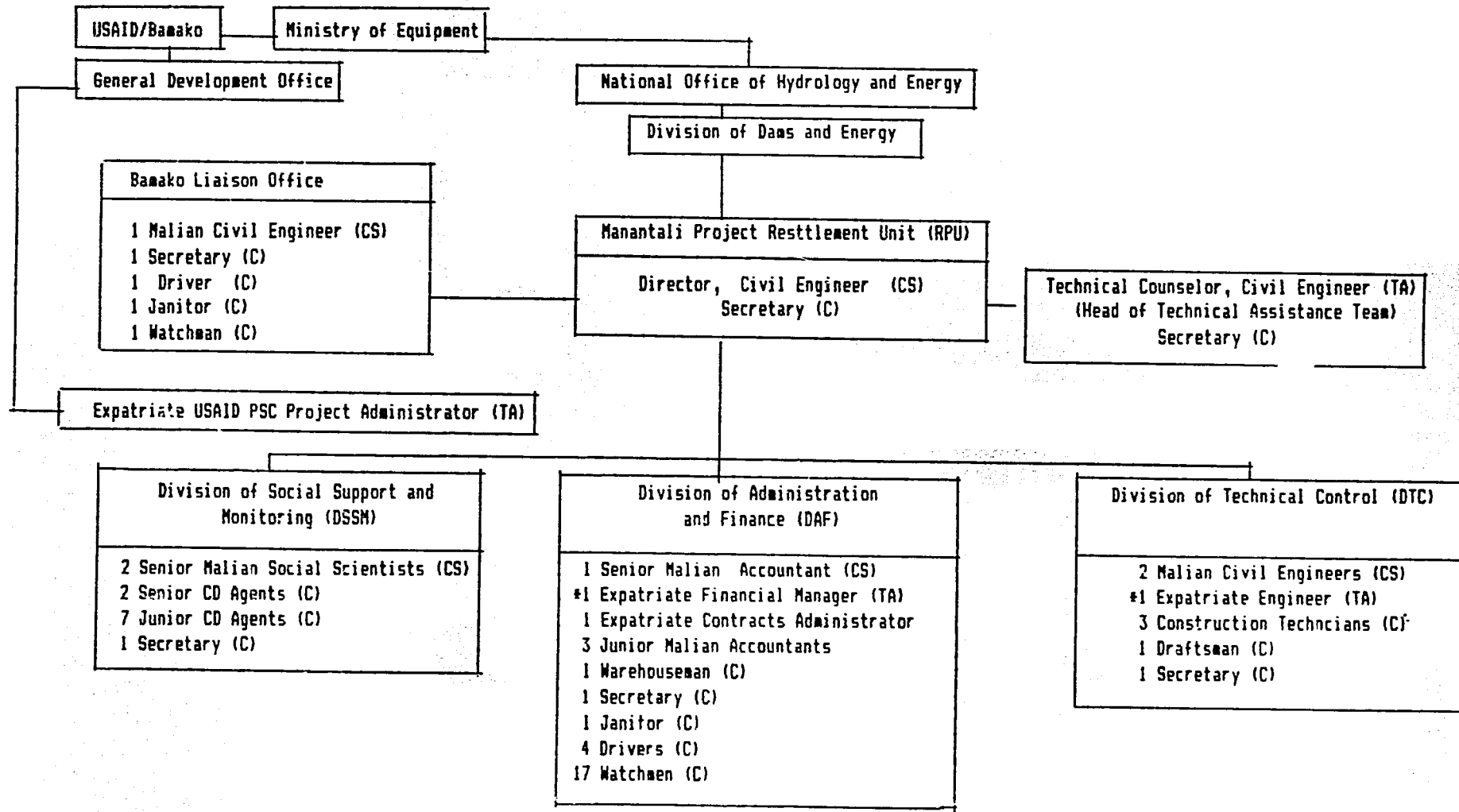
A skeleton RPU was established with the support of UNDP financing. This money has been completely spent and USAID will have to now provide the necessary support. The role of the RPU to date has been that of monitoring the pre-project studies and assisting with the planning for the actual population transfer. It currently has a staff of four Malian professionals. As the project moves into implementation, the duties of the RPU will substantially increase. Its number and capability will have to likewise be augmented. Nonetheless, the Mission and the GRM, cognizant of the limited duration of specific tasks to be accomplished by the project, have borne in mind the necessity to appropriately limit the number of civil service personnel assigned to the RPU. As much as is possible and feasible, services will be contracted via the host country mode (again, with the exception of technical assistance).

The AID financing will help the GRM maintain a liaison office at Bamako and establish a resettlement office at Manantali. The main RPU at Manantali will consist of a Directorate and three divisions. These will be the Division of Administration and Finance (DAF), the Division of Technical Control (DTC), and the Division of Social Support and Monitoring (DSSM).

The Directorate will be headed by the chief of the RPU. He will be assisted by an expatriate managing engineer. The chief will have a secretary who will also act as radio operator. The expatriate engineer will likewise have a secretary. The chief of the will have overall day-to-day responsibility for the management of project activities and for coordination with the OMVS representatives on site. His expatriate counterpart will act in an advisory capacity to the RPU chief and will serve with project for 36 months.

The Division of Administration and Finance will be staffed by a senior Malian accountant, an expatriate financial management specialist for 36 months, an expatriate contracts administrator for at least 12 months (further need will be reviewed thereafter), three contract junior Malian accountants, a warehouseman, five drivers, five secretaries, and eighteen guards to provide 24-hour security to offices and warehouses. The DAF

PROJECT ORGANIZATIONAL CHART



CS = Civil Servant
 TA = Technical Assistance
 C = Contract Support Personnel

*The expatriate technical assistants will be counterparts to the Project Director and the chiefs of the DAF and DTC. The financial Manager will be required to co-sign authorizations for obligations and expenditures of RPU operating expenses and other financial documents. The engineer in the DTC will be required to provide, with his counterpart, clearance on all acceptance of construction work. The Technical Counselor to the Project Director will be required to co-sign with the Director all recommendations to USAID to approve final acceptance and payment of vouchers for completed work. The contracts Administrator will handle all contracts or grants between the CRM and its suppliers.

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will be responsible for the proper handling of project finances, materials, and equipment. It will manage the motor pool and provide secretarial and reproduction services to all project divisions. The expatriate financial management expert (or the chief of party) will be required to provide his/her signatory accord on all expenditures or disbursements authorized or requested by the chief of the RPU. The contracts administrator will assist the RPU in preparing calls for bids, elaborating contract terms, for assuring that both USAID and GRM regulations are respected, and, in concert with the appropriate technical specialist, for seeing that the terms and specifications of the contracts are met.

The Division of Technical Control will be staffed by two Malian civil engineers, an expatriate engineer experienced with wells and rural construction, a contract Malian draftsman/designer, two contract wells technicians, and one contract construction technician. One of the two Malian engineers will control the tracks construction. The other will control all building and supervise the contract technicians who will be on the construction sites on a daily basis. The essential role of the DTC will be to coordinate and control all aspects of the construction activities financed by the project.

The Division of Social Support and Monitoring will be staffed by two senior Malian social scientists, two senior contract community development agents, and seven contract community development agents based in the field. The DSSM will coordinate and oversee the various studies and surveys to be done (described in Section 2.8.4), be responsible for the creation of the Master Settler List and the three liaison/coordinating committees, organize an orientation visit by village representatives to Selingue for a firsthand view of resettlement experience, organize training in pump operation and maintenance for both villagers and the project field CD agents, receive and distribute the World Food Program commodities, oversee the financial compensation for improved physical structures and fruit orchards, help (with the DTC, the National Topography Office, and village representatives) with platting the new sites, oversee the identification of trees to be removed, generally monitor the execution and impact of project activities in concert with the settler committees and other divisions, and organize the project mid-term and final evaluations. To assure that women's concerns are properly addressed, one of the two social scientists will be a woman. In fact, a female sociologist who participated in the Selingué resettlement has recently been assigned to the project.

Of the Malian project personnel just suggested, most will be contracted with project funds for specific periods and specific tasks during the implementation. Only the chief of the RPU the senior accountant, the two civil engineers, and two social scientists will be civil servants and thus permanently employed by the government.

Note once again that the essential tasks of the RPU will be that of coordination, contracting and procurement, oversight and control, monitoring, and liaison.

The civil service employees assigned to the RPU will be paid by the Malian government. All contract support personnel will be financed by AID project funds which will also finance office operations both in the Manantali field office and the Bamako antenna office. The latter will serve as the liaison between the field, the AID Mission, and the National Hydrological Service headquarters in Bamako. It will provide orientation and temporary office space to short-term expatriate technical assistance personnel and other GRM specialists as required. It will be responsible for local procurement and customs clearances of any project commodities procured elsewhere (offshore).

2.8.1.2 PREPARATION OF BID DOCUMENTS AND CONTRACTS

This critically important activity must be completed as soon as possible after AID/Washington has authorized project financing and the agreement has been signed with the government of Mali.

The construction of the staff offices and housing at Manantali, the site warehouses, the wells, the village housing and infrastructure, and the tracks and land clearing activity will all require the establishment of technical specifications and bid documents.

Up to twelve months of short-term technical assistance and the services of a local architectural and engineering firm will be needed to prepare the documents. Up to four months of PM&R funded engineering services will be provided to assist the RPU to prepare these technical documents. This will be furnished under an Indefinite Quantity Contract. To prepare the tracks and land clearing documents, funds will be provided to the GRM National Engineering Office (Génie Rural). To help draw up contracts, two months of short term assistance will also be furnished through a PM&R funded IQC. This task will require substantial knowledge of USAID requirements. Any additional short term assistance required before the arrival of the technical assistance team may be procured from IQC firms with project funds.

Staff offices and housing will be the same as what were built at Manantali for the OMVS, control engineer, and dam construction personnel. Since specifications for these have already been drawn up, existing documents can be modified to compile new ones needed for the RPU facilities. Further, the warehouses and village infrastructure will be simple in design and built with stone foundations, columns of reinforced concrete, cement block walls, and corrugated metal roofing over steel trusses and purlins. Engineers can use standard GRM plans and specifications to establish documents for this construction.

Village housing will be built of compressed earthen block walls with roofs of thatch over bamboo. Putting together bid documents for this activity will require expertise more in logistical planning and materials estimating than setting forth technical construction specifications.

The USAID engineering office and the project administrator, assisted by the REDSO/WCA engineering, legal, and contracts staff will review and approve the preparation of the bid documents. This responsibility will fall to REDSO when or if AID/Bamako loses its Direct Hire engineer.

Priority effort will be devoted to getting the documents for the staff offices and housing done so that a call for bids can be advertised, a contract negotiated, and work begun so that the RPU can get installed at Manantali as soon as possible.

2.8.1.3 CONSTRUCTION OF STAFF OFFICES

To install the RPU, USAID will finance the construction of approximately 345 square meters of office space at Manantali at an estimated cost of \$113,000.

The project design team has investigated every alternative available in seeking to avoid having to construct offices for a project of such limited duration and purpose. It considered the possibilities of converting empty shipping containers to offices, offshore procurement of office trailers, the purchase of the temporary "container" offices used by the crew which built the construction city, the erection of mud-block buildings, and the rental of space from the general contractor. The designers were seeking the most cost effective method of providing office space. One factor which influenced potential choices was that the terms of the contract for the dam construction called for modern air-conditioned offices to be built for construction employees, the personnel of the control engineer, and the on-site representatives of the OMVS.

All possibilities save that of building offices proved unworkable, too complicated, too expensive, or required too much time. The design team concluded that the quickest, cheapest, most effective method of getting the project team installed at the site would be to contract a local builder of proven ability to construct simple offices of cement block, metal roofing and other materials which can be locally procured.

The 345m² to be built includes thirteen offices. These will be occupied by the following individuals or groups: 1) the chief/RPU; 2) his secretary with a radio; 3) the chief's expatriate advisor; 4) the advisor's secretary; 5) the financial expert and senior GRM accountant; 6) the contracts manager, 7) the junior Malian accountants; 8) the Malian civil engineers in the DTC; 9) the expatriate civil engineer; 10) the draftsman and construction technicians; 10) the two senior Malian social

scientists; 12) the two senior community development agents; and 13) the secretarial and reproduction cell. This set-up will not give everyone their own office but it should enable the work to get done.

In addition, a drafting room of 32m², a storage room of 16m², four toilets and supply room of 28m², and a conference room of 34m² will be provided. It is assumed that the latter will be a dual purpose facility, serving both as a meeting room and an office for short-term GRM or expatriate personnel.

It is likely that a local firm which has already established a base at Manantali and constructed much of the housing and office space already built there will win the contract for this work.

Since no AID or RPU control capability will yet exist at the site, a local A&E firm will be contracted with project funds to provide both the necessary design services and construction supervision. The AID/Bamako or REDSO engineering staff will be required to authorize official acceptance and final payment for the work.

2.8.1.4 CONSTRUCTION OF STAFF HOUSING

USAID will finance the construction of RPU staff housing at Manantali at an estimated cost of \$573,000.

As in the case of the office space and, again, facing the dilemma of having to build housing that would be used for only four to five years, the design team sought alternatives which would be both practical and cost effective. The fact that modern and comfortable housing was being constructed for dam contractor, control engineer, and DMVS employees affected possible alternatives. So did the requirement of adequate housing to attract experienced and capable Malian and expatriate personnel to implement the resettlement.

The design team concluded that it would be necessary to construct modest housing for the GRM permanent civil servants and expatriate employees on the project staff. Malian contract support personnel will be asked to find and rent their own lodging and will be given a housing allowance to pay for it.

Thus, a total of ten houses will be built for RPU staff. This will amount to approximately 1100m² and will include five houses 600m² in total area and five houses 500m² in total area. The houses will lodge the chief of the RPU, his counterpart (the engineer/manager), the senior GRM accountant, the expatriate financial manager, the contracts manager, the two GRM civil engineers in the DTC, the two GRM social scientists, and the expatriate field engineer. The contract technicians, the junior accountants, the draftsman, the two CD agents, secretaries, drivers, and others will be required to locate and rent their own lodging.

In addition, seven units of temporary quarters will be built. These will each be approximately 16m² in size, each with an individual bath/toilet facility. Attached to these temporary quarters will be a common room with kitchen, pantry, and toilet about 50m² in total area. The temporary quarters will house short-term personnel, both GRM and expatriate, and serve as guest facilities for visitors such as the USAID project manager, AID/W people, and U.S. or Malian government dignitaries.

All designs for staff housing will be similar to those already built at Manantali for construction and OMVS personnel. Plans and contract documents are available from the OMVS. Technical specifications can be taken from these to put together new bid documents.

The firm that builds the project offices will also build the houses. Design services and construction supervision will be the same as described above for the offices.

2.8.1.5 PROVISION OF TECHNICAL ASSISTANCE

To help the Malian government accomplish the population resettlement, technical assistance will be provided directly to the RPU at an estimated cost of \$4,226,000.

Seven key factors affected the decision on exactly what kinds and how much technical assistance would be necessary to help the GRM move its people out of the way of the rising water.

The first factor was the need to accomplish the population resettlement in a timely and efficient manner. This would be the main contribution of the United States to the OMVS and the government of Mali for the achievement of the Manantali dam. Second, the necessity to see that U.S. assistance would be effectively utilized was important. Third, the role of the RPU was considered. Since most of the responsibility for the execution of project activities will rest with contractors, the RPU role will be limited. Nonetheless, it will be required to do a large amount of contracting. Fourth, the Malian government's desire to see that its own citizens oversee the nation's development, its sensitivity toward having expatriates in operational roles, and its view that donor assistance should first and foremost benefit Malian development was taken into account. Fifth, the institutional capability of the agency responsible for the population resettlement was analyzed. Sixth, the location of the project in a remote area of Mali's First Administrative Region was seen as a negative factor in being able to attract capable technical assistance to the project. Seventh, the requirement to provide offices and housing for each expatriate was measured.

The designers concluded that four long-term expatriate assistants would be needed to aid the RPU personnel as well as to satisfy the requirements of the U.S. government.

The four long-term technical assistants will be:

-- an experienced civil/managing engineer who will act as both advisor and counterpart to the Malian project director (the head of the RPU) and serve as chief of the TA team over 36 months

-- a general field/civil engineer with rural works experience including wells, dirt tracks and building construction to serve for 36 months as advisor and counterpart to the chief of the RPU Division of Technical Control; he/she will assist the DTC with the oversight and control of the wells component, track improvements, and other construction activities.

-- a financial management specialist with secondary skills in operational planning; he/she will serve for 36 months in the Division of Administration and Finance as counterpart to the senior Malian accountant. Duties will include advising the RPU in management and administration of local operating expenses and disbursing money as approved in the budget submitted to USAID and the DNHE. He/she will serve as a required signator on the local currency account. The financial advisor will review all vouchers submitted by contractors or for other services rendered and recommended payment to the USAID Project Officer. He/she will also assist the RPU in the preparation of monthly, quarterly and annual operating budgets, and design an accounting system for the RPU which conforms to USG requirements. The financial advisor will be responsible for training the Malian accountant and his staff in maintenance of the accounting systems installed. In addition he/she will serve as liaison between the USAID controller's Office and the RPU.

-- a contracts manager to serve for at least 12 months as the administrator of all contracts, grant-type arrangements, or agreements made between the RPU and the suppliers of commodities or services, including contract support personnel, construction contractors, and Malian government agency jobbers. The need for this position will be reviewed once most of the contracts have been let.

Each of these specialists will be engaged through an institutional contract. Given the lead time necessary to issue a request for proposals from institutions, recruit qualified personnel, select a contractor, and install the contractor on site, it is assumed that the service of the technical assistance team will begin work at Manantali no earlier than the first trimester in calendar year 1985. Thirty-six months of service will carry the team into calendar year 1988, by which time most if not all project activities will have been completed.

In addition to this long-term on-site technical assistance, about twenty-nine months of various short-term services will be provided. This will consist of 10 months of Public Health monitoring and survey execution, 4 months of Rural Sociology, 3 months of Operational Planning, along with 12 months of

miscellaneous assistance. The latter may include services from local A&E firms, both to prepare plans and bid documents and to furnish engineering control at Manantali for the construction of project offices, housing, warehouses, and social service infrastructure.

Other short-term assistance will be necessary to augment the capacity of the DAF and the DTM and to assist the Division of Social Support and Monitoring in the design of surveys or special studies needed to properly monitor project progress. Further, short term assistance of one month each year will be reserved to help the RPU to lay out an annual work plan. This should be elaborated each August when the heavy rains will normally cause a slowdown of field activities. The timing of the annual work plan should coincide with the U.S. fiscal year, i.e. planning should adopt 1 October to 30 September as the activity year since most of the work to be accomplished will be begun at the end of each rainy season -- about October 1.

Project funds will also provide a long-term contract Project Administrator to the AID Mission. This individual will be based in Bamako and will be engaged on a direct contract with the Mission for a period of forty-two months beginning in early 1984 following authorization. He/she will be responsible for the day-to-day management of the project and for liaison with the GRM, the Manantali and Bamako project offices, the OMVS, the technical assistance contract team, and USAID officials. The Administrator will be based in the Bamako liaison office of the RPU.

Finally and in addition to the administrative position just described, USAID will also engage a Construction Specialist/ Technical Advisor on a temporary basis for one year. This advisor will be engaged under a direct AID Personal Services Contract financed by project funds and will help with the preparation of all technical documentation for host country construction contracts and field supervision until the arrival of the long-term technical assistance team.

2.8.1.6 PROVISION OF RPU SUPPORT PERSONNEL

The specific purpose and limited life of the project, the financial resources of the government of Mali, the need to limit GRM recurrent cost obligations, and the desire to assist the private sector are factors which determined that RPU support personnel should be contract rather than civil service employees. USAID project funds will finance all such contracts, including post differentials and lodging allowances. The cost is estimated at \$306,000.

The contracts (host country) will be made and administered by the GRM with AID concurrence and according to both GRM and AID regulations. Personnel to be recruited under contract and attached to the RPU will be:

- one draftsman/urbanist
- three junior accountants
- three field-based construction (wells and buildings) technicians
- two senior community development agents
- seven field-based CD agents
- five secretaries
- one warehouseman
- four drivers
- one janitor for the office
- seventeen guards for the eight warehouses (both day and night and the office at night).

The Bamako-based project liaison office will be staffed with one Malian civil servant and the following Malian personnel serving under contract:

- one secretary
- one driver
- one janitor
- one night watchman

In addition, other temporary help will be engaged as needed. Foremost among these temporary employees will be day laborers to help unload or move the commodities to be supplied by the World Food Program.

2.8.1.7 DEMARCATION OF LIMITS OF RESERVOIR

An important task to be undertaken once the RPU is installed at Manantali will be the demarcation of the reservoir limit at 212 meters above sea level.

To accomplish this, a call for bids will be advertised and a host country contract will be established with a local firm. Alternatively, this activity may be delegated to an appropriate Malian government service. The cost is estimated at \$80,000.

Work will be monitored by the RPU Division of Technical Control. Acceptance and authorization of final payment will be the responsibility of the AID/Bamako or REDSO engineering office following recommendation of the RPU.

The demarcation should be completed by the onset of rainy season 1985.

The 1977 "Groupement Manantali" study listed villages to be resettled that are estimated to be located as high as 227 meters above sea level. The AID/GRM field investigations and estimates suggest that several of these villages will not have to be moved.

However, it is possible that cultivated fields adjacent to these villages may be flooded, or that water rising close to the villages will create health hazards, thus requiring that they also be resettled.

A particular problem identified in the Selingué experience which has influenced Manantali resettlement planning is the lack of knowledge of to exactly what level on the landscape the waters will rise. To be sure, the designers of the dam have calculated average and maximum reservoir levels. The height of the dam itself is known. Yet the people who will be forced to move do not know how high the water will rise.

Further, the lack of precision in the topographic maps available -- the best is at a scale of 1:20,000 -- prevent the resettlement planners from knowing the exact extent of flooding and so informing the village authorities precisely which sites and fields will be inundated.

GRM/AID field communications have provided villagers with best estimates of what sites will definitely be flooded, those which are likely to be flooded, and those which are questionable. Relocation planning has proceeded on this basis. However, as the resettlement implementation begins, it will be necessary to know exact water-level projections. Likewise, it will be necessary to point these out to villagers to dispel any skepticism about whether indeed a village has to move. The preliminary plans will have to be finalized accordingly.

The demarcation should be made at the periphery of the reservoir where land slopes upward from the existing river banks. A mark should be made every 500 meters clearly indicating the 212 meter elevation. It will not have to be done where water will rise on cliffs. The 1:20,000 scale maps established by the French National Geographic Institute in 1969 along with aerial photos of the valley at 1:50,000 should be studied to determine where marks should be placed.

The RPU will adopt 212 meters as its safety level. Any villages currently located at or below this level in the projected reservoir will be resettled.

2.8.1.8 ESTABLISHMENT OF LIAISON/COORDINATING COMMITTEES

To facilitate and hopefully ensure constant communication

between local administrative officials, construction contractors, resettlement project personnel, and the settler population, the Division of Social Support and Monitoring will seek to create three liaison and coordinating committees. The intention is to involve the settlers in the planning and execution of the move. This will be the first task of the DSSM once the RPU is installed at Manantali. The effort will be funded from the RPU operating expense budget. The committees should be established and functioning soon after the RPU is established at Manantali.

The first, referred to here as the PROJECT LIAISON AND ADJUDICATION COMMITTEE (FLAC), will be composed of one representative from each village to be resettled, the chief of the RPU, his expatriate counterpart, the head of the DSSM, the head local administrative official, and the USAID project officer. In addition, representatives of the OMVS, the control engineers, and construction contractors might be invited to participate in committee meetings as needed.

The duties of the FLAC will be to approve the annual RPU work plan, to coordinate the overall resettlement effort and sub-activities, and, through the village representatives, to provide advance notice to the villagers of tasks planned for each phase of the project. The committee will also function as a grievance board to hear and adjudicate any inter-village disputes over land or water resources which may arise, to address any claims of insufficient compensation for trees or above-standard housing, and to resolve any other disputes or grievances which cannot be settled at the village level.

The chairman of this committee will be the head local government administrative official. The vice chairman should be selected by the village representatives from among themselves.

This committee will meet at the administrative headquarters town of Bamafélé every six months, or more as needed and jointly decided. A small honorarium of 1,000 FCFA will be paid to each village representative on the occasion of each meeting to defray transportation or other expenses.

The second body, here called the VILLAGE/PROJECT COORDINATING COMMITTEE (VPCC), will be a local unit composed of project representatives and villagers from each resettling village. The permanent RPU representative will be one of the field-based contract community development agents. The agent will act as the permanent on-site liaison between the village, the RPU and construction contractors. The make-up of the village representation should be self-defined but will most likely reflect the traditional decision-making structure, i.e., a council of the male heads of extended families.

The duties of this committee will be to coordinate resettlement activities at the local level, including identifying and approving site platting for concessions and fields, assisting the RPU in the compilation of the Master List of settlers and

their possessions, identifying non-productive trees to be cleared from fields, facilitating the distribution of World Food Program commodities, coordinating financial compensation for trees or above-standard housing, overseeing the reestablishment of village orchards and shade trees, and organizing the construction of mosques, granaries, latrines, fences and other such communal structures and thereby facilitating the allocation of materials for this purpose.

The chairman of the VPCC will be named by the village members of the committee, although it is likely that he will be the village chief or his designee. The vice-chairman will be the CD agent.

The VPCC will meet as often as jointly agreed by its members but this should be no less often than once a month. Initial meetings should be held at existing villages. However, once activities begin at the new village sites meetings should take place at these locations. The village population must be made aware of the necessity of having a committee presence at the new sites and thus constitute its membership accordingly. The third committee, to be organized by the senior female sociologist, will be composed of selected village women, including the representative of the Malian National Women's Union. This group will be consulted on a regular basis, regarding placement of wells within the village, location of compounds, village fields, and any other issues of special concern to the local women. This group will meet as often as the VPCC, and it will be the responsibility of the senior sociologist to report the findings of this committee to the RPU chief as well as to USAID and to assure that the women's needs are considered in all decisions.

With the constitution of these three committees, participation of the beneficiaries in all phases of the resettlement should be assured. However, project management will have to take care that no special interests dominate any of the committees to the detriment of the powerless. In this regard, the interests of women and children may require special attention.

2.8.1.9 ESTABLISHMENT OF MASTER SETTLER LIST

Reference to this list has been made above. The compilation of a list of all people to be resettled or otherwise affected by the dam construction will be a task of the Division of Social Support and Monitoring. The Master List should be completed before the onset of rainy season 1985. The effort will be funded by the RPU operating expense budget.

This list will update the information furnished in the study done by the Institute for Rural Economy. Its purpose will be: a) to establish a precise roll of people, their structures which must be rebuilt, and their belongings which must be moved; b) to determine quantities and plan the distribution of construction materials required by each family concession; c) to verify

eligibility for the products to be provided by the World Food Program as well as amounts necessary; d) and to identify cultivated and producing fruit trees, above-standard housing or wells, and anything else for which an economic loss may be predicted and reasonable compensation calculated.

Each head of extended family should be issued an identification booklet with the names of all family members making up part of the settler population.

The list will be compiled under the direction of the DSSM but actually established by the field-based CD agents and villagers through the Village/Project Coordinating Committees just described.

2.8.2 VILLAGE RECONSTRUCTION

The activities described below consist of the construction to be financed under the project. These constitute the essential activities by which the resettlement success or failure will visually and materially be measured.

2.8.2.1 FINAL SITE SELECTION

The RPU will have to finalize new site selection with villagers and local administrative officials before new site layouts can be done and village-level construction activities can get underway.

Once the liaison committees have been established and the field-based CD agents are at their sites, the process of final site selection can proceed. RPU personnel will have analyzed all data provided by the detailed UNDP studies on the hydrogeology and soils at various locations, will present these to the Village/Project Coordinating Committees, explain the advantages of some over others, and will make their recommendations to committees for consideration.

Based on experience and the continuing dialogue GRM and Mission personnel have conducted with the settlers, it is anticipated that certain villages will seek to change the selections they made in mid-1983 after much discussion which were subsequently officially recognized by the local government administrative authorities. Note that these decisions were made after preliminary results of UNDP site studies became available and that in probably every case villagers had experience with and knowledge of the characteristics and ecology of their selections.

Serious requests for site changes will be put before the Project Liaison and Adjudication Committee for approval. To accommodate reasonable requests, the RPU has identified alternative sites in each resettlement zone which have not been assigned to or thus far chosen by any villages. These will be described and their relative merits weighed. The V/PCCs should be able to finalize their site selections based on information available.

Since the studies have proven the viability and potential of the provisional selections, the RPU personnel will attempt to minimize changes based on political or social maneuvering. Discussions of various sites with village representatives have been extensive to date. These must come to an end. The site selection process must be completed so that construction can begin.

2.8.2.2 LAYOUT OF NEW VILLAGES

The GRM Office of Urbanism and Construction will oversee the lay out the new village sites and fields utilizing the aerial photos of existing villages and the topographical plans of the new sites. It is expected that this organization will contract the job to a private Malian firm. The contract will be financed by funds remaining in the UNDP project.

Terms of reference and specifications for this work have already been drawn up and a private firm identified. The contract will be established in the third trimester of FY1984. Thus, once project authorization has been granted by AID/W and the project agreement has been signed, project funds will be available to support field work by staffers already working with the RPU.

It is anticipated that most provisional site selections will indeed become final. Thus, the process of platting the new villages sites should begin immediately at those locations to which the first villages will be transferred in the spring of 1986.

New site layouts should be a joint effort involving the members of the Village/Project Coordinating Committees, the RPU technical and social science specialists, and the personnel of the National Office of Urbanism and Construction.

Villages will be relocated in several groups in which the old settlement will become a new neighborhood or "quarter" in the new grouping. Each village will retain its individuality and may even choose to retain the name it was known by at the old site. Villages in any one grouping will be located so as to be one to two kilometers distant from each other, thus allowing adequate area for the cultivation of house fields and gardens. This loose amalgamation into village clusters should result in a population density high enough to justify the future provision of additional social infrastructure -- depending on the social and economic development which follows the completion of the dam.

A general policy of constructing the new villages according to the spatial delineations existing in the old ones will be adopted to minimize potential disagreement and endless bickering about the location of concessions which could disrupt contractor schedules and delay the population transfer. Nonetheless, it is recognized that instances of family fission have taken place as

numbers of people have increased and original village layout did not allow for an expansion of the compound. Other social factors may demand some adjustment in village plats. In addition, topography, drainage requirements, access tracks, and the efficient placement of water points will affect the layout of the new sites and dictate changes. The RPU will attempt to justly accommodate and at the same time avoid construction delays.

Responsibility for addressing desired or requested changes will have to be borne by the Project/Village Coordinating Committees and specifically by the village representatives on the committee.

This work will be controlled by the RPU Division of Technical Control with assistance from the Division of Social Support and Monitoring.

All new site layouts should be completed by mid dry season 84-85.

2.8.2.3 CLEARING/UPGRADING TRACKS TO NEW VILLAGE SITES

USAID will finance about 200 kilometers of track improvement in the project for an estimated cost of approximately \$2,379,000.

Designs and technical specifications will be drawn up by the cCM Office of Rural Engineering (Génie Rural) with oversight furnished by the RPU) and a short-term expatriate engineer.

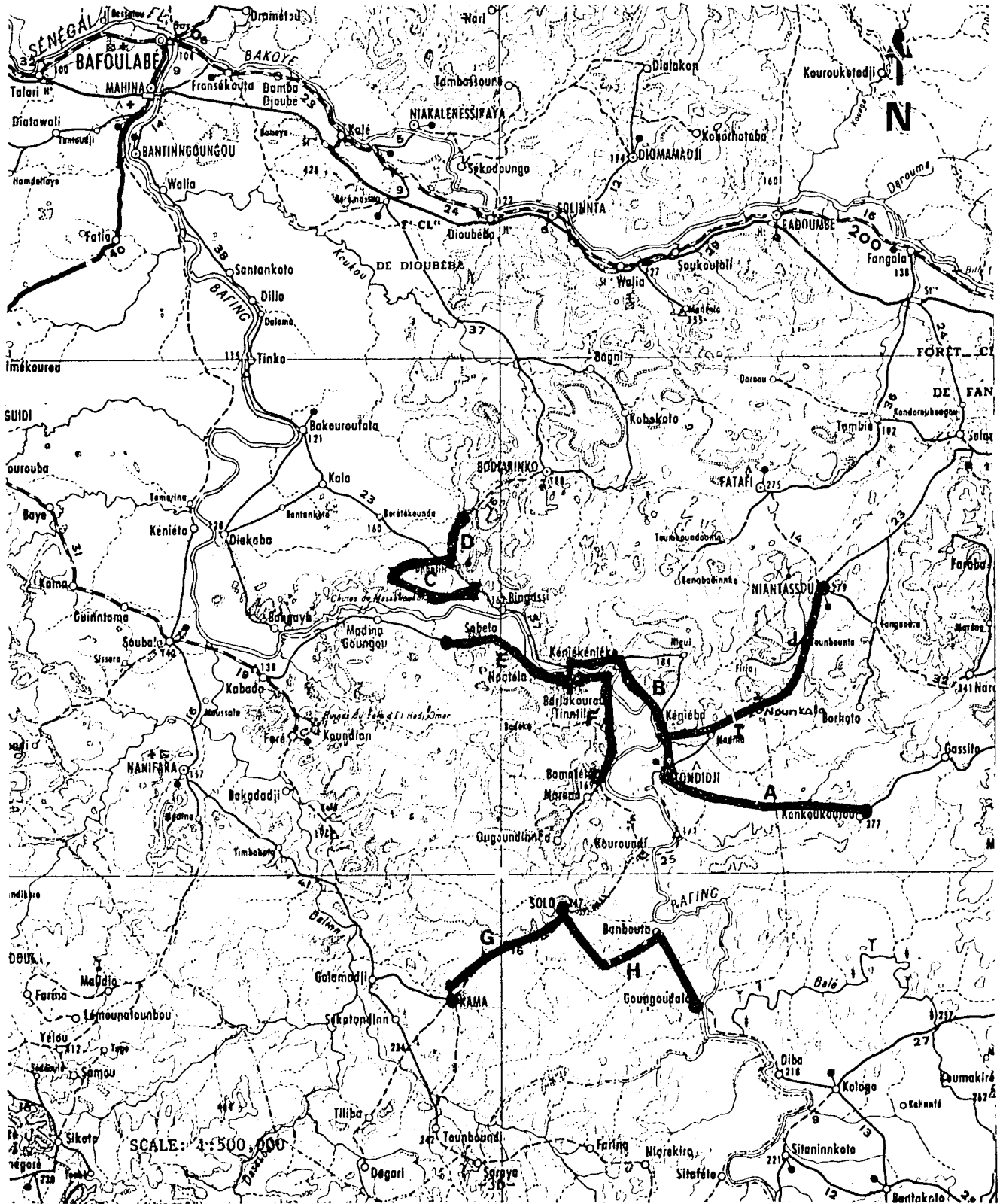
Improvement of the tracks will be executed by the GRM Office of Rural Works and Equipment (OTER). Construction will be undertaken on a fixed-amount-reimbursement (FAR) basis per kilometer.

Track improvement work will be overseen and controlled by the Malian road engineer attached to the RPU Division of Technical Control with daily on-site assistance provided by the contract construction technician.

Designs and specifications should be completed in late 1984. Construction work should begin in the early dry season 1984-85 and be essentially complete by the end of dry season 1986-87.

To successfully execute the population resettlement, access to both existing and new villages must be assured. Thus, the trails and rudimentary tracks (now connecting the outside world with villages which must relocate) have to be maintained -- in some instances slightly upgraded -- at least until the actual transfer of people and their belongings takes place. Also, new tracks must be cleared or graded to provide access to the new village sites -- to allow the delivery of equipment and materials, to facilitate communication and construction, to enable the RPU to distribute the World Food Program commodities, to move people to their new homes, and to link the new villages with the major commercial routes toward the towns of Mahina and Kita.

RECOMMENDED TRACK IMPROVEMENTS/CONSTRUCTION
AMELIORATION/CONSTRUCTION DES PISTES



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Tracks will lead into the five resettlement zones. Track planning has taken into account the projected population density of each of the zones, soil and rainfall conditions, the rocky terrain, drainage requirements, the current and anticipated vehicular traffic in the area, markets, the probable lack of post-project maintenance, project logistical needs, and the costs of construction. A number of construction options and alternative routes have been considered. Coordination with the Deforestation Project, to be financed by the Federal Republic of Germany (the KFW), has been undertaken. The tracks' plan thus represents what has been concluded by the design team to be the essential minimum number of kilometers necessary. The method and nature of improvement will likewise be the most cost effective possible.

The German-financed (KFW) Deforestation Project may construct some 40 kilometers of road from the southeast into the resettlement zone of Tintioulen. This segment is also proposed for USAID financing. In discussions with KFW representatives, AID/Bamako officials requested that this route segment be undertaken by the Deforestation Project. However, at this point the Deforestation Project planning is behind schedule, no decisions have yet been taken, and no assurances could be given. Yet KFW representatives have indicated that their most likely route into the project area will be further south, toward Kologo where it is believed the deforestation activity project base will be installed. Thus, the Tintioulen segment has been retained in the Resettlement Project design.

The AID/Bamako or REDSO/WCA engineering office will be required to authorize final acceptance and approval of all segments of the tracks improvements.

2.8.2.4 CLEARING NEW VILLAGE SITES/FIELDS

To help the settlers reestablish their agricultural livelihood, USAID will finance the clearing of 5,500 hectares of land for an estimated cost of \$633,000. This includes 500 hectares on which the new villages will be sited and 5,000 hectares for croplands.

The technical specifications and bid documents for this activity will be drawn up by the Office of Rural Engineering.

The rationale for this activity is twofold: to encourage the reestablishment of agricultural activities at the new village sites as soon as possible and to provide settlers assistance with the laborious and physically demanding task of clearing new areas for crop cultivation.

Estimating the number of hectares of cropland necessary to clear has proven difficult for several reasons. For example, in the main resettlement zone only about 10% of potential cropping area appears to have been cleared before. On the other hand, 70% of the land in the zone east of Tondidji seems to have been cleared in the past. Moreover, it is difficult to determine whether fallow land has been included in the hectareage figures provided by the socioeconomic survey.

The design team has thus derived its figures by estimating the average area actually cultivated on a year to year basis by all farmers -- that is, by all the people who can be considered as part of the active farming population. Fallow lands are not included and will not be cleared by the project.

Several methods of clearing were considered. The most cost effective, environmentally sound, labor and equipment efficient alternative which will also accommodate maximum villager participation was chosen. This will involve using bulldozers,

equipped with shear blades to cut down and move selected larger trees, and equipped with chains or bladed rollers to pull down and crush the smaller trees and shrubs, in situ.

Once final site selections have been made, members of the Village/Project Liaison Committees will be asked to identify -- by marking with paint or another distinctive material -- trees in the village proper and in fields which should be removed. Thus, productive or otherwise valued trees will be retained. Root systems will be left intact and litter left on-site so that disturbance of soil cover is minimized and topsoil properly protected.

Large trees cleared from the sites will be pushed aside and used for firewood during the following rainy season, thus reducing the labor required for this usual dry season task. As in traditional systems, farmers will themselves be responsible for final clearing and burning remaining litter and brush and grass from their fields. The RPU Division of Technical Control will supervise this activity with the help of on-site assistance from the field-based CD agents.

This will be carried out under the same agreement as the tracks improvements above. The final work plan will be approved by the Mission Environmental Officer and the engineering staff of AID/Bamako or REDSO/WCA will officially approve all work following the recommendation of the RPU.

2.8.2.5. CONSTRUCTION OF WELLS

A combination of drilled wells and cisterns -- a total of 81 will be built -- will be provided in each of the new villages at an approximate cost of \$2,569,000. The National Hydrology Service will execute this activity under an agreement to be concluded with the RPU and approved by USAID.

Technical specifications will be drawn up by the RPU with the help, if needed, of short-term technical assistance.

Several alternatives have been considered for village water supply. Needs for domestic use have been carefully estimated. Due to the relative proximity of the river, livestock water needs will not be provided for by the project wells component.

Due in part to the remoteness of the Manantali area, no pump repair infrastructure exists. To minimize villager reliance on imported pump technology, a drilled well/cistern combination is considered most appropriate -- although more costly -- for village water supply. In this system a borehole will be drilled into the confined aquifer to the depth which will yield the required amount of water. A deep cistern reinforced by concrete rings will then be constructed alongside the borehole -- to a depth several meters below the water level in the borehole. The maximum average depth of the cistern is estimated to be 20 meters. The borehole

and cistern will then be connected by a horizontal shaft. Static pressure will feed water from the borehole into the cistern. People will thus be able to draw water from the cistern as they wish.

A total of 45 combination boreholes/cisterns--one or more at each new site--will be built. In addition, 36 boreholes will be drilled but these will not be joined to a cistern. Thus, 81 new water points will be constructed by the project. All of these will be equipped with manual pumps made in Mali. Further, some 17 of the existing positive test bores will be equipped with manual pumps at village construction sites. This will be necessary so that water for construction needs -- for warehouses, infrastructure, blockmaking -- will be available soon after project funding has been authorized and site activities commence. Hence, by the end of the project 97 water points should be in operation.

This activity will be overseen at the construction site by two Malian wells technicians who will be directed by the expatriate rural engineer and the Malian civil engineers in the Division of Technical Control.

The engineering office of AID/Bamako or REDSO/WCA will officially accept all wells construction as complete and satisfactory upon recommendation from the RPU.

2.8.2.6 CONSTRUCTION OF SITE WAREHOUSES

The project will finance the construction of eight warehouses at a cost of \$256,000.

This work will be included with the construction of staff offices and lodgings and should be built by the same contractor.

The bid documents will be put together by a local A & E firm.

One of these will be a central warehouse 200m² (8m x 25m) in size located at the site of New Bamafélé. Seven smaller ones of 75m² each (5m x 15m) will be located proximate to each of the seven sites where groups of villages will be clustered. Thus, three will be built in Zone 1 where three village groupings will be located. One each will be built in Zones 2, 3, 4, and 5.

Warehouse sizes are based on World Food Program food stockage requirements and delivery and distribution plans elaborated with representatives of the WFP in Mali.

The warehouses will serve as storage and distribution points for construction materials and subsequently World Food Program foodstuffs. Their design is simple and based on standard GRM plans. Construction materials will be reinforced cement block with corrugated metal roofing over steel trusses and purlins.

The large warehouse will serve post-project as the replacement for the existing agricultural extension agency (ODIPAC) storage facility at Bamafele. Two of the smaller structures will replace cooperative storage buildings which will be lost in the reservoir. The other five small warehouses will also be able to serve (post-project) as local storage structures or be put to other use as village infrastructure of any other sort desired by the inhabitants.

Execution of this activity will be competitively bid and awarded to a private firm via a host country contract.

To ensure that proper building methods and materials meet the required specifications, this activity will be supervised by the same local A & E firm that oversees the construction of the staff offices and housing.

Work will be officially approved by an AID direct hire engineer.

2.8.2.7 CONSTRUCTION OF VILLAGE HOUSING

A critical component of the Manantali Resettlement Project is the construction of village housing and other structures. This must be accomplished so that people can be moved beginning in May 1986. The cost is estimated at \$3,028,000.

Bid documents for this activity will be drawn up by the RPU with help from short-term technical assistance. On-site work should begin in October 1985. Project implementers should decide whether or not to reserve the execution of this activity for a Malian or American Private Voluntary Organization.

USAID will finance the construction of about 4,500 dwellings and materials for 3,000 granaries, 450 kitchens, 650 chicken pens, 300 livestock shelters, 1,000 concession wells of various height and length, a few other public buildings such as mosques, and the digging of 1,000 latrines (i.e., one latrine in each concession).

These estimates are based on the preliminary inventories done by AID and the Institute of Rural Economy and will be updated during the project execution by the RPU Division of Social Support and Monitoring.

The final housing figure will include traditional dwellings to be provided for low level civil servants -- teachers, midwives, foresters, and so on -- at New Bamafélé. The exact number of these houses will be based on the total civil personnel assigned there, excluding the chief administrative official, his deputy, the school director, and the head medical official for whom improved lodgings will be built.

To accomplish the village construction, a contractor will be retained to build the walls of all the dwellings. These will be slightly improved by using compressed -- though unstabilized -- earthen block. Roofs will be built of the traditional materials of bamboo and thatch by family members or village work crews. Thus, family representatives as well as members of the Village/Project Coordinating Committees will have to be on-site to assist with the construction planning and execution.

All other structures will be built by family members or village self-help groups, depending on how the village organizes its building effort. The contractor will provide all blocks and thatch necessary to build the other structures. However, bamboo will be transported from the former village sites to be reused for all buildings other than dwellings. The same will be true of window or door closures for structures other than dwellings.

Given material averages shown in Annex 7.2.5, it is estimated that the project will need 5,000,000 compressed earthen blocks to be made; 542,000 bamboo pieces averaging five meters in length, of which 320,000 to be purchased; 78,000 bundles of thatch to be purchased; and 4,500 corrugated metal doors to be made with wooden frames treated for insect resistance.

To produce the required number of blocks in the given timeframe, the contractor might organize 40 four-person blockmaking crews to turn out a minimum of 400 blocks per day over 22 workdays per month during a 7-month dry season in both 1985-86 and 1986-87. This organization of labor would have to be provided with presses and other tools as well as the soil and water necessary to make the blocks. This effort would produce 4,930,000 blocks which should provide a margin sufficient to cover breakage or other unforeseen needs.

Presses required are estimated to number 100, which suggests that each one would be expected to produce 50,000 blocks without mechanical failure.

Procurement of the required bamboo and thatch should be done by the contractor via public offer to purchase for a fixed amount per piece or quantity delivered to a specific location.

To build 4,500 dwellings, the contractor should organize 25 three-person building crews (a mason and two laborers) to work over two seasons constructing one dwelling per day over 90 workdays each season. This organization would produce 4,500 dwellings in the time period suggested. Additional work days might be programmed to provide a margin of contingency.

Upon recommendation of the Division of Technical Control of the RPU, the engineering office of AID/Bamako or REDSO/WCA will be required to approve and officially accept all construction.

2.8.2.8 CONSTRUCTION OF ADMINISTRATIVE AND SOCIAL INFRASTRUCTURE

To replace infrastructure that will be flooded at Bamafélé and to establish government services at the site of New Bamafélé, USAID will finance 1600 m² of construction of various buildings at an estimated cost of \$573,000.

Although these buildings will be constructed according to standard GRM plans, designs and technical specifications will be done by a local A & E firm. Bid documents will be prepared by the RPU. The work should be done by the same contractor that builds the staff offices and housing. Construction should begin in mid-dry season 1984-85 and be completed by mid dry season 1985-86. On-site supervision of the work will be provided by the A & E firm and monitoring by the construction technicians in the RPU Division of Technical Control supervised by the DTC engineers.

Structures to be financed include:

-- a total of nine classrooms (for one or two schools) of 600m² and an office (each room 10m long x 6m wide x 4m high)

-- a local government administrative building of 100m² containing three offices and a storeroom (each 5m x 5m)

-- a maternity clinic of 170m² containing waiting, consultation, delivery, store rooms, and a kitchen

-- a dispensary of 75m² containing waiting, consultation and store rooms

-- a health support outpost of 55m² containing two rooms at Tintioulen

-- a pharmacy of 115m² containing sales and store rooms and an office

-- a forestry post of 75m² containing an office and storerooms

-- a veterinary post of 75m² containing an office and storerooms

-- four modest dwellings, including cooking and latrine areas, with a total of 250m² to house the chief administrative official in a 85m² structure, and his assistant, the school principal, and the medical officer in houses 55m² in area

-- an administrative guest facility of 76m² with four rooms each 16m² in size plus a washroom/latrine of 12m².

Each of these buildings replaces existing structures -- most of which are built of non-compressed mud block, some with cement

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plaster, some without -- now in use at Bamafélé. The replacements financed by USAID will be of higher quality, built with cement block walls and corrugated metal roofing on rock rubble foundations. The designs and cost estimates for these buildings are based on GRM standard plans from the appropriate ministry. Other structures at Bamafélé will also be replaced but by another project activity. Specifically, the large warehouse owned by the agricultural extension agency (ODIFAC) will be replaced by the 200m² structure to be built at New Bamafélé. Two smaller storage facilities belonging to the Federation of Rural Cooperatives will be replaced at other new sites by the 72m² warehouses. (See above, Section 2.8.2.6).

Before beginning construction of any of this infrastructure, USAID will ask the GRM coordinating committee for OMVS projects to secure a letter from each concerned ministry, indicating a commitment to provide the personnel required to staff the facilities.

Upon the recommendation of the RFU a USAID engineer will be required to officially approve all completed work.

2.8.3 SUPPORT ACTIVITIES/TRANSFER

2.8.3.1 PUBLIC HEALTH SUPPORT

As stated in the section on village social and administrative infrastructure, the project will finance construction of a health post at New Bamafele, the administrative seat of local government. This will replace the facility that will be flooded at the old site. It will provide primary health care services to the settlers population in Zones 1, 2, and 3.

In addition, a health support post will be established at New Tondidji (Tintioulen) to furnish such services in Zones 4 and 5. However, no permanent medical staff will be stationed here. This support post will receive monthly visits from the staff based at New Bamafele.

During the conduct of the epidemiological/nutritional status survey (described below in Section 2.8.4.2), the medical team will administer treatment for schistosomiasis through a single dose of praziquantel to each afflicted individual diagnosed. Diagnosed cases of trypanisomiasis will be referred to either Manantali or Mahina and treated there.

Regular monitoring of the health status of the settler population will be carried out at the field level by the community development agents and the local GRM health personnel. These staffers, both project-employed and regular government personnel, receive some training in public health monitoring as a normal part of their program of studies. Nonetheless, to enhance their knowledge, the National Institute of Public Health Research in

collaboration with the personnel of the IDA-financed KBK (Kita, Bafoulabe, Kenieba) health project mentioned will be engaged to provide better training to the field CD agents and health staffers. Funds to accomplish this have been budgeted under the rubric of Special Services. In addition, 4 person months of technical assistance have been provided to specifically help with the monitoring of settler public health during the approximately two months of actual population transfer in both 1986 and 1987.

Equipment and furnishings for the health infrastructure to be built will be provided by project funds. Moreover, one month of short term technical assistance has been budgeted to assist the Ministry of Health organize the equipment at the new facilities and set up operating systems for patient treatment and record-keeping, including inventories. Personnel and operating expenses will be furnished by the GRM Ministry of Health.

Note that nutritional support will be provided by the World Food Program in the form of foodstuffs donated to the project and distributed to the settlers by the RPU. This is described below in Section 2.8.3.3.

Finally, to address any unusual or abnormal deterioration in settler public health status related to or seemingly caused by

the relocation to the new villages, a contingency fund of \$100,000 will be available. It is found budgeted under Special Services.

2.8.3.2 AGRICULTURAL SUPPORT

The project design team has considered the provision of various kinds of agricultural support to the population. Given the experience of past resettlement efforts and the advice not to introduce innovations during the period of stress caused by the forced relocation, the designers ruled out providing or introducing production equipment, extension techniques, and credit schemes of any kind. Two possibilities for assistance seemed the most practical and needed--handtools and seed. However, the design team concluded that such help would not be necessary, for reasons which will be seen below.

It is likely that the settler population will try to farm at two locations during the year the transfer occurs, i.e., in the fields at the old village sites and at the new locations as well. (It will, in fact, be project policy to encourage the establishment of the new farmholds the year before a village is scheduled to move.) Further, people will have to do some clearing of fields at the new sites. It is thus reasonable to conclude that family handtools like hoes, machetes, and axes will be spread between the two locations. Labor could be more efficiently utilized, it was thought, if the RPU provided an additional supply of handtools to each family concession. With such help,

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the new farmsteads would be more quickly established and the agricultural livelihood once again set on a solid base that much sooner. Moreover, the blacksmith families of the area would profit from orders and cash purchases of such tools. The local economy would benefit.

It is also likely the seed will be in short supply, particularly if people cultivate at two locations. The project might distribute selected seed -- again, to help reestablish the agricultural base as soon as possible -- at the level of the concession in each new village.

The project designers chose not to include the provision of seed and tools among the project activities to be financed by USAID. The reasons are varied. First, the numbers and kinds of tools currently owned and used by settlers are likely a function of family labor availability. There might not be hands available to utilize additional tools. Second, it was felt that there are too few blacksmith families in the project area to fill such a potentially large tool order, so the RPU would have to supply the order from Bamako. In the case of seeds, every family traditionally guards its seed supply with care. In the relatively high rainfall area of the Bafing Valley, total crop failure due to draught is unusual and seed scarcity is less of a problem than elsewhere in the Sahel. Further, there is a government agricultural agency -- the Office for the Integrated Development of Peanut and Cereals Production (ODIPAC) -- which theoretically provides extension and other support services in the resettlement project area. This would be the logical organization to offer such assistance to the settler population. Finally, the design team concluded that the RPU would have enough absolutely essential tasks to carry out without the added logistical and management burden of providing seed and handtools to people and properly accounting for the expenditure of project funds for such items. Therefore, after much reflection and discussion between U.S. and GRM project planners, these activities were excluded from USAID funding support.

Nonetheless, it is recognized that a need may arise, most likely for seed, that the RPU may well be called upon to address. To plan for this possibility and to foresee a potential funding requirement, the project designers believe that contingency allowances that go unused in other line items -- for example, the various construction activities -- might be expended for seeds or tools in an emergency.

It is also acknowledged that additional study of soil quality and potential at certain sites may be required in order to identify the best cropping locations and assure farmers of fields at least equal in potential (if not actual) to those they will be forced to vacate. Should the need arise, a contingency fund of \$100,000 will be available. This is budgeted under Special Services.

Hence, although contingency funds may be tapped if necessary,

direct project agricultural support consists essentially of helping farmers clear new fields as described under Section 2.8.2.4.

2.8.3.3 RECEPTION/DISTRIBUTION OF WORLD FOOD PROGRAM COMMODITIES

Past experience with forced population resettlements has demonstrated that the nutritional status of people suffers during the relocation itself and for some time thereafter. Women and children are usually the hardest hit and this will indeed be the case in this instance, particularly because of the loss of productive fruit trees and the disruption of household gardening.

The design team has concluded that at least three farming seasons, perhaps more, will be required to reestablish normal food production activities. Thus, to assist people during this period of nutritional stress and to compensate settlers for helping rebuild family concessions, the World Food Program (WFP) has been asked by the GRM to provide food aid to the people who must relocate (letter of request is annexed in Section 8). The WFP has responded affirmatively and has programmed approximately 6,000 tons of food commodities for the resettlement effort. About

4,400 tons are destined to be distributed to the settlers and the remainder will be available to distribute to salaried workers employed in the various construction components.

Food for the settler population will provide nutritional support to each individual -- child and adult -- whose name will be inscribed at the time the Master Settler List is compiled (described above). The food commodities will be distributed at the level of each concession over a period of two years -- the year of the move and the subsequent year. Since villages will move in two sets -- one set of villages in May/June 1986 and one in May/June 1987 -- the total distribution period will be spread over three years.

Each individual will receive a daily ration -- thus 730 rations over the two year period -- consisting of 510 grams of foodstuffs broken down as follows:

- 400 grams of cereal (probably kernal corn)
- 30 grams of cooking oil
- 30 grams of canned fish
- 30 grams of canned meat
- 20 grams of powdered milk

Planning sessions with the WFP have been productive, as

indicated earlier. Estimates of total tonnage of food necessary were reached and the supply mechanics have been worked out with one important problem -- that of transport of the commodities to the project zone -- tentatively solved through mutual agreement between USAID and the WFP. According to this agreement, WFP will transport the commodities to the railhead at Mahina where it will offload them into WFP warehouses. The RPU project trucks will then move the food directly to the central warehouse and also to the seven smaller warehouses in the areas of village relocation.

USAID will provide fuel costs in the RPU operating budget for the transport from Mahina. The RPU will be responsible for the distribution of the food from the central warehouse to the site warehouses in the downstream zones on the right bank and on the left bank (at Sobela and Banfara), and the three upstream locations (at Nounkala, Tintioulen, and Kologo-Goungoudala).

The Village/Project Liaison Committees will be asked to organize a pickup schedule concession by concession and village by village. Since distribution to the first recipients will commence in the spring of 1986 coinciding with village reconstruction and relocation, people will be encouraged to construct their granaries in a speedy manner so as to have space

to store the food. In fact, the RPU might ask the V/PLCs to adopt a policy requiring that concession granaries be completed before WFP food can be distributed.

Food allotments will be requested by the RPU six months in advance of the desired delivery date. About 750 tons will be furnished every six months over the three year period.

One square meter of storage space is required for each 1.8 tons (1800 kilograms) of foodstuff, according to WFP personnel, in warehouses allowing for stacking at least four meters high. This amounts to a short term storage requirement of about 420 tons in project warehouses which will have a total capacity of 725 tons. They should thus be able to accommodate storage requirements for food as well as project construction equipment and materials as necessary.

Fuel costs to be financed by USAID funds covering transport from Mahina to the Project warehouses have been estimated as follows:

-- tonnage of 4,400

-- average truck capacity of 10 tons

-- thus, number of truckloads/trips required is 440

-- average distance each round trip from Mahina to project warehouses will be 140 kilometers

-- total kilometers 61,600 (440 x 140)
-- average fuel consumption of ten ton truck is 30 liters of diesel per 100 kilometers

-- fuel requirements thus 18,480 liters

-- fuel cost (61,000 / 100 x 30 / x 192.5 FCFA/liter / 375FCFA/\$1 = \$9,486

Cost for moving foodstuffs to the project warehouses at the upstream and left bank sites has been estimated as follows:

-- tonnage required to be delivered by RPU is 1,440 (based on population to be resettled at these sites).

-- truck capacity of 10 tons

-- 144 trips required

-- average round trip from central warehouse to upstream and left bank sites is 100 kilometers

-- cartages fees of 20 FCFA per ton per kilometer (based on current transport prices)

-- 144,000 ton kilometers required

-- total cartage cost of (144,000 x 20 FCFA / 375FCFA/\$1 = \$7,680

In addition to these costs, an estimate of temporary labor needed to load and unload trucks consisted of 200 mandays in each of project years 1986, 1987, and 1988. Figured at \$2.50/manday the labor cost estimates amount to \$2,265.

Total estimated USAID funding necessary for the transport and distribution of WFP commodities including 7% inflation is thus put at \$20,000. These funds will be part of the RPU operating costs paid in local currency for which disbursement must be approved by the RPU financial manager. Fuel, transport, and labor will be engaged via contract.

Subsequent to project authorization, project implementers must investigate the possibility of modifying both the plan for the location of site warehouses and the proposal for WFP commodity delivery. It may well turn out that provision of food aid to the upstream sites will be easier done from Kita than from Mahina from the outset. Further, the final year of food aid distribution will be in project year five --1988. By this time the reservoir will theoretically have begun to fill and existing roads along the river bank will likely be flooded. The upstream resettlement areas will be accessible most easily from Kita. It may therefore be optimal to ask the WFP to establish storage depots both at Mahina and Kita to facilitate the food distribution. Firmer decisions can be taken on this issue once the final site

selections have been made.

2.8.3.4 ESTABLISHMENT OF TREE NURSERY

To help reestablish fruit orchards, particularly mangos, as a productive part of the resettlement zone farming system, a tree nursery will be financed by the project. The RPU will contract with the GRM's Eaux et Forêts to set up the nursery at New Bamafele which will be located in the main resettlement zone where the settler population will be the highest density.

The cost of the contract will be about \$70,000 broken down as follows: capital costs are estimated at \$50,000 which will finance construction of a 32m² (4m x 8m) storeroom, water basins (2m²), fencing, and a well equipped with a handpump. (It is hoped that one of two positive test bores can be equipped with a pump and satisfy the needs of the nursery). Operating expenses are estimated at \$20,000 over five years to pay five laborers.

The nursery will begin operations by January 1985. It will be one hectare in size and produce about 30,000 trees per year. Species will include both grafted and ungrafted mango, orange, lime, guave, grapefruit, and papaya as well as neem and prosopis.

It is assumed that if the nursery produces good quality trees no distribution or extension system will be needed. Information about the availability of saplings will be disseminated via the Village/Project Coordinating Committees at the village level. Since cash compensation will have been paid to tree owners, saplings will be sold rather than distributed free of charge.

This support is designed to help farm families reestablish their orchards in the shortest time possible and thus limit hungry season nutritional deficiencies in the settler population. It will also help rebuild the economic base, in which fruit trees play a major role.

2.8.3.5 SPECIAL COMPENSATION/ALLOWANCES

The project will compensate people for financial losses caused by the forced relocation of villages. Funds for this purpose have been budgeted at \$277,000, including allowances for inflation and contingency.

Several losses already identified and justly deserving compensation include improved housing and wells, the missionary facility at Keniekenieko, and cultivated fruit orchards.

In the case of buildings, identifying improved construction (that is, with corrugated roofing and cement block or plaster as opposed to mud and thatch) and estimating replacement costs has not been difficult. At this point, only ten such structures have been identified by USAID and GRM personnel. These include the Protestant Mission housing and clinic with a replacement cost estimated at \$40,000 by the USAID contract engineer. For this

facility, an agreement for \$20,000 in financial compensation has been concluded by the design team and missionary authorities, subject to the approval of the GRM and USAID/Washington. Other structures thus far identified are three houses at Kenieba (proprietor Fakoumagan Dembélé), one at Yintilla (proprietor Bourie Namogo), the mosque at Kenieba, and an improved dwelling at Keniekenieko. The initial estimates made for the purpose of budgeting a proper amount of financial compensation are thought by the design team to be high. Therefore, once the RPU is established at Mananatali, further estimates will be made to determine compensation. Nonetheless, a total of \$142,000 (including \$20,000 for the missionary structures) has been included in the project budget to be used for compensation for improved house, well, or other construction, each example to be justified and judged on a case by case basis.

It should be mentioned here that the case of the missionary facilities bears upon installation of the RPU at Manantali. As part of the agreement to provide compensation for these facilities, it was concluded that the RPU will occupy them once the missionaries have vacated and up to the time that staff offices and lodgings have been completed at Manatali.

The other major item identified for compensation -- productive fruit trees -- has been more difficult to cost out, for the simple reason that the economy of fruit production in the Bafing Valley is not known. It has thus been necessary to base our cost estimate on knowledge of production elsewhere, mainly Mali's Third Region.

The preliminary inventory provided in the study done by the Institute of Rural Economy counted about 1900 producing hardwood, domesticated fruit trees, mostly mango and orange. What the project design team has had to do is calculate a productive value for the trees. This has been done in the following manner. The productive life of a tree -- with the exception of bananas -- has been assumed to be fifteen years on the average, considering disease, termites, drought, and woodpeckers, and taking into account the exceptional longevity and production of mango trees. The average age at which production begins is assumed to seven years. Grafted trees produce earlier but there are few such trees in the Bafing Valley. The value of annual production per tree was derived by informally asking a sample of farmers to estimate it. The figure assumed is a conservative \$7 (2,500 francs CFA), due mainly to fruit quality and to lack of real access and proximity to markets. Household consumption has likewise been conservatively estimated at 25%. The fact that a farmer must tend a tree for seven years before it begins to produce has also been taken into account in these calculations. Thus, the design team has concluded that each hardwood fruit tree estimated to be from four years of age to fifteen years of age will be considered for compensation at a rate not to exceed 28.125 francs CFA or about \$75. This figure reflects a reduction for household consumption for which the World Food Program commodities will furnish caloric compensation, although the design team recognizes

that the important nutritives element of vitamin C, so vital prior to the cereal harvest, will be seriously diminished.

Banana trees will not be considered for financial compensation since shoots can produce fruit in a matter of months and tree life is short. Shoots can, moreover, be easily transplanted and banana orchards quickly established at the new village sites. These trees do not represent the long-term investment demanded by tended hardwood fruit species. Therefore, WFP commodities will make up the nutritional loss, if any, that may be caused by flooding of banana trees.

The RFU Division of Social Support and Monitoring will be required to oversee an update and completion of information on types and numbers of domesticated fruit trees, their ages, and ownership. This might be accomplished by the field CD agents, depending on area will be isolated and inaccessible. The amount of \$135,000 has been budgeted for the purpose of compensating settlers for the loss of productive trees. With allowances for inflation at 7% per annum compounded through the third year of the project plus a contingency allowance of 20% , the total amount of such compensation -- including that for improved physical structures -- has been estimated at \$277,000.

Although not budgeted under the line item for corea will be isolated and inaccessible. The amount of \$135,000 has been budgeted for the purpose of compensating settlers for the loss of productive trees. With allowances for inflation at 7% per annum compounded through the third year of the project plus a contingency allowance of 20% , the total amount of such compensation -- including that for improved physical structures -- has been estimated at \$277,000.

Although not budgeted under the line item for compensation, the allowances that will be provided to GRM project personnel, both civil service and contract employees, merit mention here. As discussed in the Social Soundness Analysis, salaries at the dam worksite are based on levels set by Senegalese law. They are much higher than Malian salaries. Thus, the lowest paid laborers employed by Manantali construction contractors earn just slightly less than the GRM director of the resettlement project paid at Malian wage levels. By the same token, OMVS representatives at Manantali, including the OMVS chief and the resettlement project liaison worker who are both Malians, earn between six and ten times the same amount.

It is clear that, were this project executed multilaterally by the OMVS rather than bilaterally by the GRM, the personnel would be remunerated at the Senegalese standard. Thus, both to be able to attract qualified personnel and for equity reasons, the design team provided a line item in the project budget to furnish salary supplements, herein called hardship allowances, to Malian civil service and contract employees of the RFU. For Manantali-based employees, monthly allowances have been budgeted at 50% of annual

salary to help compensate for the difference. In addition, work demand allowances (to compensate for the many extra hours that implementation of this project will require) have been budgeted for civil service employees at a rate of 75% of annual base salary.

Monthly housing allowances will also be paid to Malian RFU contract personnel at a rate of 20% of base salary, i.e., not including the hardship allowance. Thus, the majority of contract employees will receive about \$20 per month to pay for lodging. Watchmen will get about \$15 monthly.

Note that none of the personnel, civil service or contractor, based at the Bamako antenna office will be provided with any hardship or housing allowances. However, a work demand allowance has been budgeted for the civil service employee in the Bamako liaison office.

Civil service employees based at Manantali will not receive any housing allowances since they will reside in houses built by the project.

2.8.3.6 POPULATION TRANSFER

The population will be moved to their new sites in two sets of villages. The first will move in May 1986, the second in May 1987. Villages affected by rising water caused by the fourth diversion of the river at the dam construction site will be accorded priority as outlined in the transfer plan seen in Annex 7.1.

A trucking company or trucking cooperative will be contracted to provide vehicles to accomplish the move. This will be a host country contract awarded on the basis of competitive bidding by the RPU with AID concurrence. The cost is estimated at \$214,000 including allowances for inflation and contingency.

For the purpose of logistical planning and budget calculations, a population figure of 11,000 has been used. Likewise, the average concession size has been estimated at 11 people (intentionally conservative), and thus the figure of 1,000 concessions.

A ten ton truck, the most common vehicle used for road transport in Mali, has been considered as the means of transfer.

The transfer cost will pay for 1,000 round trips of a ten ton truck, including fees for fuel and drivers. The outbound leg of each trip will move one family concession and its belongings. The truck will deadhead on the return trip.

An average length of time for moving one concession has been calculated at six hours.

Two concessions will be moved during each day of the transfer operation. 500 concessions will be moved each year.

250 trucks days will be needed each year.

25 transfer days will be programmed for each of the two years, to begin about mid May.

Ten trucks will be needed each year for the transfer but eleven trucks will be leased for a period of one month each. The 11th truck will provide a margin of assurance so that the move can be accomplished in the allotted time.

The population transfer will be orchestrated and monitored by the RPU Division of Social Support and Monitoring in conjunction with both the valley-wide Project Liaison and Adjudication Committee and the individual Village/Project Coordinating Committees.

2.8.4 MONITORING AND STUDIES

2.8.4.1 MONITORING OF PROJECT ACTIVITIES

The three divisions of the Resettlement Project Unit, all based at Manantali, will have immediate responsibility for following the progress of activities. Each should be able to measure results against an annual work plan put together each August with the help of expert short-term technical assistance in operational planning. In addition, short-term technical assistance has been budgeted to help the RPU formulate a monitoring plan based on the various analyses annexed in Section 7.

The Division of Administration and Finance (DAF) will control the expenditure of funds (including RPU operating expenses, the salaries of contract support personnel, construction or other contractor advances or payments, keep inventories of equipment and furnishings, establish and control maintenance schedules (for vehicles, offices machines, household and office furnishings, and the physical use policy and fuel allowances, and monitor consumption. It will furnish the project director with a monthly financial report for use as a management tool.

The Division of Technical Control (DTC) will follow all construction activities. Its engineers and technicians will spend most of their daily working hours at the various construction sites viewing contractor methods and verifying the achievement of technical specifications as set forth in the contract documents. The division chief should be able to provide a monthly reports of progress or problems to the project director. For special help with construction control, the DTC will be able to call on short-term technical assistance as necessary.

The Division of Social Support and Monitoring (DSSM) will have constant project representation -- the seven field-based community development agents -- at the new village sites. These agents will be able to assist the DTC with monitoring on-site construction activities as well ask keeping up with the planning and coordination responsibilities of the Village/Project Coordinating Committee, In addition, the DSSM will follow the execution of the archaeological and the epidemiological/nutritional surveys (described below). The update of the information on numbers of people and their belongings -- intended to be used to compile the Master Settlers List -- and the verification of compensation requests will likewise be the responsibility of this division. As the need arises or is determined, the DSSM will have to conceive any other supplementary studies or surveys and contract for the expertise to do them. For this task, the DSSM will be able to draw on short-term technical assistance -- social science, public health, survey design, data analysis, or other -- as necessary. The excellent analysis done by the Institute for Development Anthropology (annexed in Section 7.8) should serve as the basis for monitoring to be done by the DSSM.

2.8.4.2 EXECUTION OF EPIDEMIOLOGICAL/NUTRITIONAL SURVEY

Project funds will finance a survey to establish baseline data on disease epidemiology and nutritional status of the population affected by the dam construction. The cost will be about \$255,000. The National Public Health Research Institute (INRSP) will execute the survey with the help of seven person-months of technical assistance: an expert in epidemiological survey design, methodology, and logistics (1 month); and epidemiologist (4 months); and a computer programmer/data analyst (2 months). It is assumed at the time of this writing that the experts financed by West German aid (GTZ) now working with the Institute may be able to furnish the required technical expertise, in which case costs to the project may well be reduced.

The survey should be undertaken in dry season 1985-86.

The survey target will include the settlers, villagers living at higher elevations around the reservoir who will not be forced to relocate, fishermen, and people making up the labor force or other such newcomers to the area.

The major objective of the epidemiological survey will be to establish solid data on prevalence rates for schistosomiasis and trypanosomiasis, the former because it is believed that the change in the river regime and creation of the artificial lake will result in a much greater incidence of this disease, and the latter because several cases were recently identified among the labor force.

At the same time that the survey is executed, the team will administer a single dose of praziquantel to individuals infected with schistosomiasis. Survey team members will also arrange the necessary 25-day treatment for people afflicted with trypanosomiasis. This plan is seen as being exceptionally cost effective in helping to limit the spread of these diseases, particularly if health authorities can identify, examine, and treat, if necessary, all the professional fishermen who are likely to migrate into the area once the lake is created.

The nutritional survey, conducted simultaneously, will be directed to children in the 1-5 year age group -- that in which changes in weight might occur most rapidly as a result of nutritional or other stress associated with the relocation. The survey will measure the height, weight, and upper arm circumference of the children and thus establish a Bafing river valley standard for Malinke children. The standard will enable public health authorities to monitor improvement or deterioration in the nutritional status of the population.

Funding these surveys should enhance the capacity of the National Public Health Research Institute to monitor the health status of people in the Senegal River basin.

2.8.4.3 EXECUTION OF ARCHAEOLOGICAL SURVEY

The project will finance an archaeological survey of the area -- historically important but previously unstudied -- that will be flooded in the Manantali reservoir. The survey will cost about \$30,000. It will be executed by the GRM Institute of Social Sciences (Institut des Sciences Humaines) and should be undertaken prior to rainy season 1985. The survey will require an estimated two months of field work by an ISS team composed of archaeologists, historians, physical anthropologists, and specialists in Malinke oral tradition.

The intent of the survey is to identify and inventory any potentially important archaeological sites early enough to allow time for intensive study should the perceived historical importance of any sites so dictate. However, such additional study will have to be funded by other donors -- such as UNESCO -- since only the reconnaissance survey will be supported by the resettlement project.

Implementation will be via an inter-agency agreement between the RPU and the Institute of Social Sciences, approved by USAID. Monitoring will be done by the RPU Division of Social Support and Monitoring. Contract payments will be authorized by the RPU Director and approved by the RPU financial manager for submission to USAID.

Methodology will include stratifying the geomorphology (landforms) of the reservoir area using topographical maps and aerial photos. A small initial sample (e.g. 5%) of each landform should be chosen and divided into equal size transects, then walked, and each site or evidence thereof recorded. The sample transects, to be chosen at random, should allow the extrapolation of data and conclusions from the sample for the entire reservoir area. As time and additional funding may allow, the entire number of sample transects walked may be increased, or concentrated effort may be devoted to particular sites.

The survey should ensure that no important archaeological site go undiscovered and unstudied before being permanently inundated by the flood waters.

2.8.4.4 OTHER SPECIAL STUDIES/SURVEYS

Funds have been included in the project budget for other, as yet undefined, studies or surveys for which the need may arise. These might consist of a study of the resettlement impact on women and children, a look at how farming systems remain the same or undergo modification, changes in family social structure brought about by the move, or other research. These would be designed by the Division of Social Support and Monitoring (DSSM) but executed by a consulting firm or government agency under

contract to the RPU. Depending on its capability and workload, the DSSM might likewise wish to contract survey expertise to compile the Master Settler List or verify claims for compensation.

3.0 COST ESTIMATES/FINANCIAL PLAN (\$000 except where indicated \$)

3.1 CONSTRUCTION

3.1.1 OFFICES	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
12 offices (192m2*)	48	-	-	-	-	48
1 conference room (32m2)	8	-	-	-	-	8
1 drafting room (24m2)	4	-	-	-	-	4
2 storage room (32m2)	4	-	-	-	-	4
4 toilets (16m2)	6	-	-	-	-	6
* unit costs \$250/m2						
Distance Factor (20%)	14	-	-	-	-	14
Inflation (one year @ 7%)	6	-	-	-	-	6
Des/supervision (7%)	6	-	-	-	-	6
Contingency (10%)	10	-	-	-	-	10
(SUBTOTAL)	106	-	-	-	-	106

3.1.2 STAFF HOUSING	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
5 3BR (600m2*)	180					180
5 2BR (500m2)	150					150
Transit Unit (150m2)	45					45
* \$300/m2						
Distance Factor (20%)	75					75
Des/supervision (7%)	32					32
Inflation (one year @ 7%)	34					34
Contingency (10%)	52					52
(SUBTOTAL)	568					568

3.1.3 SITE WAREHOUSES	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
1 central (200m2*)		40				40
7 field (525m2)		105				105
* \$200/m2						
Distance Factor (20%)		29				29
Des/supervision (7%)		12				12
Inflation (7% two years) (15%)		28				28
Contingency (20%)		42				42
(SUBTOTAL)		256				256

3.1.4 WELLS	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
72 Drilled Wells (unit cost: \$15,167)		1092				1092
72 Cisterns (unit cost: \$16,000)		1152				1152
Water Pumps/Installation						40
Inflation (7% two years) (15%)		40				343
Contingency (10%)		343				263
(SUBTOTAL)		263				2890
		2890				

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3.1.5 TRACKS	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
206 kilometers (unit costs vary)		1970				1970
Contingency (10% included plus 5%)		99				99
Inflation (7% two years)		310				310
(SUBTOTAL)		2379				2379

3.1.6 LAND CLEARING	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Equipment Fees (1195 days \$333)		398				398
Distance Factor (20%)		80				80
Inflation (7% two years)		72				72
Contingency (15%)		83				83
(SUBTOTAL)		633				633

3.1.7 VILLAGE HOUSING	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Houses (4500 \$320*)		1440				1440
Granaries (3000 \$90)		270				270
Cookhouses (450 \$65)		29				29
Livestock shelters (300 \$60)		18				18
Chicken Pens (650 \$10)		7				7
Concessional Walls (1000 \$50)		50				50
Latrines (1000 \$15)		15				15
Distance Factor (20%)		366				366
Inflation (7% two years)		329				329
Contingency (20%)		504				504
(SUBTOTAL)		3028				3028

* Housing unit cost includes overhead fees for all structures

3.1.8 INFRASTRUCTURE	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
School (600m2*)		150				150
Admin HB (100m2)		25				25
Maternity Clinic (170m2)		43				43
Dispensary (75m2)		19				19
Health Outpost-Tintioulen (50m2)		13				13
Pharmacy		29				29
Forestry Post (75m2)		19				19
Veterinary Post (75m2)		19				19
Four dwellings (4-250m2)		63				63
Transit House (76m2)		19				19
* \$250/m2						
Distance Factor (20%)		80				80
Inflation (7% two years)		72				72
Contingency (10%)		55				55
(SUBTOTAL)		606				606
3.1.9 CONSTRUCTION TOTAL	6/4	9792				10466

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3.2 COMMODITIES	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Vehicles:						
All terrain 4 wh/dr (8)	120					120
Spare Parts kits (8)	16					16
Ten ton Truck w/parts (2)	80					80
Motorbikes (20)	12					12
Ltwt PU truck w/parts (1)	10					10
Locally-made canoes (2)	2					2
Outboard motors (3) w/5-gal fuel tanks (4)	5					5
Office Equipment *	70					70
Office Furnishings *	53					53
House Furnishings *	164					164
Health Support Equipment *			44			44
Inflation (7%)	37		7			44
Contingency (10%)	57		5			62
(SUBTOTAL)	626		56			682

Note: A detailed procurement list for office furnishings and equipment and for house furnishings is found in Section 5, the Procurement Plan. The Health Support furnishings and equipment for the village infrastructure (for the maternity, dispensary, and pharmacy units, and the health outpost) as well as for the epidemiological/nutritional survey is attached to the Public Health Annex seen in Section 7.7).

3.3 RESETTLEMENT PROJECT UNIT OPERATING EXPENSES

3.3.1 OFFICE MAINT/OPERATIONS	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
BAMAKO:						
Rent	2	4	4	4	4	18
Utilities/Phone	2	4	4	4	4	18
Maintenance	2	1	1	1	1	5
Supplies	2	1	1	1	1	5
Radio Publicity		1	2	1	1	5
MANANTALI:						
Office Utilities	2	12	12	12	12	50
Office Maintenance (Bldgs & Equip)		2	2	4	4	12
Supplies		2	2	2	1	7
House Utilities	2	30	30	30	30	112
House Maintenance (Bldgs & Appliances)		2	4	6	6	18
(SUBTOTAL)	10	59	62	65	54	250

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3.3.2. VEHICLE MAINT/
OPERATIONS

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
BAMAKO:						
Fuel	1	3	3	3	3	13
Service		.5	.5	.5	.5	2.0
MANANTALI:						
Fuel (8 4-wh/dr, 2 boats, 1 truck, 15 motorcycles)	6	25	30	30	15	106
Service	1	4	4	6	2	17
(SUBTOTAL)	8	33	38	40	21	140

3.3.3. CIVIL SERVICE
PERSONNEL ALLOWANCES *

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Hardship (50% of base)	5	10	10	10	5	40
Cost of Living (25% base)	1.5	2.5	2.5	2.5	1.5	10.5
Work Demand (75%)	4.5	7.5	7.5	7.5	4.5	31.5
(SUBTOTAL)	11	20	20	20	11	82

* Note: No allowances budgeted for Bamako-based personnel.

3.3.4 RPU CONTRACT SUPPORT PERSONNEL

3.3.4.1 SALARIES (\$)	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Draftsman/Urbanist (1-42 pm 100)	600	1200	1200	1200		4200
Wells Technician (2-42 pm 100)		2400	2400	2400	1200	8400
Construction Technician (1-42 pm 100)	300	1200	1200	1200	300	4200
CD Agents (9-48 pm 100)						

TA (4 person Long-Term Team - 8 (a) mode)

3.3.4.2 HOUSING ALLOWANCES* (\$)	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Draftsman (20/mo)	120	240	240	240		840
Wells Technician (20/mo)		480	480	480	240	1680
Construction Technician (20/mo)	60	240	240	240	60	840
CD Agents (20/mo)	1080	2160	2160	2160	1080	8640
Junior Accountants (20/mo)	360	720	720	720	720	3240
Secretaries (20/mo)	600	1200	1200	1200	1200	5400

Warehouseman (20/mo)		240	240	240	120	840
Drivers (20/mo)	600	1200	1200	1200	1200	5400
Janitors (RPIJ-based 15/mo)	90	180	180	180	180	810
Guards (15/mo except Bamako-based)	90	1620	3060	3060	900	8730
(SUBTOTAL)	3000	8280	9720	9720	5700	36420

* Note: No housing allowances budgeted for Bamako-based personnel.

3.3.4.3. HARDSHIP *

ALLOWANCES (\$)	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Draftsman (50%)	300	600	600	600		2100
Wells Technician (50%)		1200	1200	1200	600	4200
Construction Technicians (50%)	150	600	600	600	150	2100
CD Agents (50%)	2700	5400	5400	5400	2700	21600
Junior Accountants (50%)	900	1800	1800	1800	900	7200
Secretaries (50%)	1500	3000	3000	3000	3000	13500
Warehouseman (50%)		600	600	600	300	2100
Drivers (50%)	1500	3000	3000	3000	3000	13500
Janitors (50%)	450	900	900	900	900	4050
Watchmen (50%)	360	3600	6480	6480	2160	19080
(SUBTOTAL)	7860	20700	23580	23580	13710	89430

* Note: No hardship allowances budgeted for Bamako-based personnel.

3.3.5 SPECIAL TRANSPORTATION

3.3.5.1 IN-COUNTRY AIR RAIL	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Air Passenger (50rt/yr)	5	5	5	5	5	25
Air Freight	20	20	20	20	20	100
Air Charter (12/yr)	12	12	12	12	12	60
Rail Passenger (50rt/yr)	2	2	2	2	2	10
Rail Freight	5	5	5	5	5	25
Personnel per diems	1	3	3	3	2	12
(SUBTOTAL)	45	47	47	46	46	232

3.3.4.3. HARDSHIP *

ALLOWANCES (\$)	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Draftsman (50%)	300	600	600	600	-	2100
Wells Technicians (50%)		1200	1200	1200	600	4200
Construction Technicians (50%)	150	600	600	600	150	2100
CD Agents (50%)	2700	5400	5400	5400	2700	21600
Junior Accountants (50%)	900	1800	1800	1800	900	7200
Secretaries (50%)	1500	3000	3000	3000	3000	13500
Warehouseman (50%)	-	600	600	600	300	2100
Drivers (50%)	1500	3000	3000	3000	3000	13500
Janitors (50%)	450	900	900	900	900	4050
Watchmen (50%)	360	3600	6480	6480	2160	19080
(SUBTOTAL)	7860	20700	23580	23580	13710	89430

* Note: No hardship allowances budgeted for Bamako-based personnel

3.3.5 SPECIAL TRANSPORTATION

3.3.5.1 IN-COUNTRY AIR RAIL

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Air Passenger (50rt/yr)	5	5	5	5	5	25
Air Freight	20	20	20	20	20	100
Air Charter (12/yr)	12	12	12	12	12	60
Rail Passenger (50rt/yr)	2	2	2	2	2	10
Rail Freight	5	5	5	5	5	25
Personnel per diems	1	3	3	3	2	12
(SUBTOTAL)	45	47	47	16	46	232

3.3.5.2 WFP COMMODITIES DISTRIBUTION

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Fuel	-	-	2	5	3	10
Cartage	-	-	2	4	2	8
Labor (200pd/yr 2.50/day)	-	-	.5	1	.5	2
(SUBTOTAL)	-	-	4.5	10	5.5	20

3.3.5.3 POPULATION TRANSFER

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Truck rental	-	-	92	92	-	184
(SUBTOTAL)	-	-	92	92	-	184
Inflation (7% comp)	-	16	49	79	58	202
Contingency (15%)	15	36	58	64	36	209
(SUBTOTAL rpu op/ex)*	116	281	452	498	279	1626

*Note: Rounding of figures results in variations in added totals.

3.4 RPU TECHNICAL ASSISTANCE TEAM

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Hydrogeologist (36pm)	-	60	60	60	-	180
Road Engineer (36pm)	-	60	60	60	-	180
Financial Manager (36pm)	-	50	50	50	-	150
Cont/Grants Manager (36pm)	-	50	50	50	-	150
Rural Sociologist (4pm)	-	8	4	4	-	16
Public Health Specialist (10pm)	-	8	16	16	-	40
Operations Planner (3pm)	-	4	4	4	-	12
Misc TA (12)	-	16	16	16	-	48
Field Diff/Cola	-	64	65	65	-	194
Local Secretary (36pm)	-	12	12	12	-	36
Local Expediter (36pm)	-	12	12	12	-	36
Drivers (72pm)	-	6	6	6	-	18
Watchman (36pm)	-	3	3	3	-	9
Janitor (36pm)	-	3	3	3	-	9
(SUBTOTAL)	-	356	361	361	-	1078

Other Direct Costs (telephone, telex, passports, immunizations, postage, reproduction)

	20	20	20	-	60
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Overhead (115% base salaries plus other direct costs)		317	322	322	-	961
Education Allowances		60	60	60	-	180
trans/Storage HHE		28	8	28	-	64
Fringe Benefits (Ins, Pen 22% of base)		64	65	65	-	194
Travel/RR/HL		48	48	48	-	144
U.S. PSC Administrator	30	120	120	120	30	420
Liaison Engineer/Consultant	-	40	-	-	-	40
(SUBTOTAL)	30	697	643	663	30	2063
Inflation 7% comp	-	73	70	71	4	220
Contingency (5%)	3	75	73	74	3	225

3.5 SPECIAL COMPENSATION	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
3.5.1 Tree Crop Losses	-	-	130	-	-	130
3.5.2 Improved Housing/Wells/Other	-	-	50	-	-	50
3.5.3 Missionary Facilities	20	-	-	-	-	20
Inflation (7% comp)	-	-	41	-	-	41
Contingency (15%)	3	-	33	-	-	36
(SUBTOTAL)	23	-	254	-	-	277

3.6 STUDIES/SPECIAL SERVICES	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Archaeology	-	30	-	-	-	30
Epidemiology/Nutritional	-	254	-	-	-	254
Reservoir Demarcation	-	80	-	-	-	80
Tree Nursery	-	70	-	-	-	70
Master Settlers List	-	15	-	-	-	15
Public Health Training	-	-	5	-	-	5
Pump Operation/Maintenance/Training	-	-	25	25	-	50
Compensation Verification	-	25	-	-	-	25
Health Contingency	-	-	-	-	-	-
Soils Analysis Contingency	-	50	50	-	-	100
Other	-	15	15	15	-	45
(SUBTOTAL)	-	539	95	40	-	674
Inflation (7% year)	-	38	7	3	-	47
Contingency (10%)	-	58	10	4	-	72
	-	635	747	47	-	793

3.7 EVALUATION	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Mid-Term (10pm)	-	-	150	-	-	150
Final (10pm)	-	-	-	-	150	150

Inflation (7% comp)	-	-	35	-	59	94
Contingency (none)	-	-	-	-	-	-
(SUBTOTAL)	-	-	185	-	209	394

3.8 WORLD FOOD PROGRAM CONTRIBUTION

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Foodstuffs including transport	-	-	1370	2740	1370	5480

MALIAN GOVERNMENT/SETTLERS CONTRIBUTION*

	FY 84	FY 85	FY 86	FY 87	FY 88	TOTALS
Preparation of technical Documents	176	-	-	-	-	176
Salaries	6	16	16	16	16	70
Land	-	-	69	69	-	138
Settler Labor	-	-	200	400	200	800
Settler Production Losses	-	-	400	800	400	1600
Inflation (7% comp)	-	1	99	289	191	580
(SUBTOTAL)	182	17	784	1574	807	3364

* Note: These figures have been estimated as follows:

The government contribution to the preparation of bid documents for the construction activities has been assigned the value of 2% of the total building costs.

Salaries are those paid by the GRM for permanent civil service personnel attached to the project but do not have a calculation and a monetary extrapolation for the value of Manantali resettlement work time contributed by civil servants not assigned to the project.

Land was estimated at 5500 hectares, not including any fallow cropland, on which the new village will be built and new fields will be cleared. The land was assigned a value of \$25 per hectare, or about \$10 an acre.

Settler labor was assigned a value of 1000MF per day, or about \$1.20. The labor force (active workers) was estimated at 5000. It was assumed that settlers will contribute 120 workdays (or half of their annual labor) toward the reconstruction of their households and reestablishment of their fields both during the year of the move and the following one. This would be a labor contribution to the resettlement effort with an assigned value of about \$1,600,000. However, the WFP commodities were considered as equivalent to half the value of the settler labor and their total labor contribution was therefore adjusted to \$800,000.

Settler production has been assumed to undergo a 50% reduction during the resettlement over two years. Estimated loss of income was thus calculated at 50% of annual per capita income of \$160 for a rounded population figure of 10,000. This amounts to \$800,000 per year or \$1,600,000 over two years, a figure adopted as a settler contribution to the relocation.

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4.0 SUMMARY IMPLEMENTATION ARRANGEMENTS

4.1 ORGANIZATIONAL RESPONSIBILITIES

The Manantali Resettlement Project will be financed by a bilateral agreement between the government of Mali and USAID.

The Malian government has been delegated the responsibility for execution of the project by the OMVS Council of Ministers.

The Ministry of State Equipment (Ministère d'Etat Chargé de l'Équipement) is the coordinating organism for all OMVS activities for the GRM.

The National Hydrology Service is the agency within the Ministry which oversees Manantali developmental actions.

Within this agency, the Division of Dams and Energy has direct responsibility for monitoring the construction of the dam for the government.

A special Resettlement Project Unit (RPU) was created in this division in 1982. It was staffed with two civil engineers and a sociologist plus support personnel. Operating expenses were paid by the UNDP from the \$300,000 pledged for studies and consultancies intended for planning the resettlement project. The RPU role was to coordinate and monitor these efforts. This unit will have direct responsibility for coordinating and managing the population resettlement and has been raised to the status of a separate division in summer of 1984.

USAID will provide funding for the project but will play no direct role in the execution of activities. However, AID will enter into a direct contract with an American consulting firm to provide four long-term technical assistants -- a financial manager, a managing engineer, a field engineer, and a contracts administrator -- as well as needed short-term expatriate to the government Resettlement Project Unit (RPU). AID will also directly engage a Project Administrator for 42 months and a Construction Consultant for 8 months, both under a project-funded Personal Services Contracts.

The RPU will be responsible for letting host country contracts via competitive bid for all other procurement of services, save that procured by inter-agency cooperative agreement with other GRM entities. This will include host country contracts for the design, construction, and supervision of staff offices and lodgings, social services infrastructure, and warehouses. This construction contract will be established, following the bidding process, with a private sector construction company. Design/supervision services will be furnished by a Malian A & E firm. For tracks, design work will be done by the GRM Office of Rural Engineering and the construction executed by the Office of Rural Works and Equipment, both under inter-agency agreements. Cisterns and boreholes will be done by the National Hydrology

Service under a similar arrangement.

The village reconstruction can be implemented by a local construction firm, a government agency, or an American or Malian Private Voluntary Organization. This decision will best be made by the RPU and USAID as the project gets underway.

USAID will assist the RPU with initiating other procurement required prior to the arrival of the technical assistance personnel. Subsequently, all procurement will be the responsibility of the RPU, assisted by the expatriate contractor.

Surveys, special studies, or special activities -- for example, the archaeology and health surveys and the tree nursery -- will be executed by the appropriate GRM agencies via agreements according to terms set forth in general in the grant agreement and in detail in an implementation letter. These might also be done by qualified private sector entities via a host country contractual arrangement with the RPU.

USAID financing will enable to RPU to contract the Malian support personnel necessary to properly control and monitor the private firms or government agencies which execute project activities.

Technical assistance attached directly to the RPU will assist with coordination, control and monitoring of activities. The engineer will be required to provide technical clearances with his GRM counterparts for the acceptance of all construction work recommended for final payment. The expatriate financial management expert will cosign authorizations for disbursement of all RPU operating funds, payments under Host Country Contracts, or grant monies to GRM agencies for special surveys, studies or other such activities. The field engineer will work with the technicians in the RPU Division of Technical Control. The contracts administrator will assist with all contracts or inter-agency agreements entered into by the RPU.

Besides planning, coordinating, contracting for, and monitoring construction and survey activities, the RPU will plan and oversee the distribution of World Food Program Commodities. It will also be responsible for establishing just rates of compensation for settler losses within the budgetary limits of this line item.

To assure the participation of villagers in the resettlement effort, the RPU will establish three kinds of committees. The first of these is project wide and will include a representative from each village that must relocate. The second will be village-based and village-focussed. The third will represent village women.

To help assure that the needs of women and children receive proper attention, one of the senior GRM sociologists already assigned to the RPU is a woman who was heavily involved in the Selingue Resettlement.

The project will be assigned to the portfolio of the General Development Office in USAID/Bamako.

The USAID/Bamako contract Project Administrator, based in Bamako, will manage the project on a day-to-day basis for the Mission. Prior to the arrival of the T.A. team, no funds will be turned over to the RPU. All bills will be paid directly by USAID, with checks from the Regional Financial Center in Paris. After the arrival of the T.A. team, an operating fund will be administered by the financial advisor, who will be required to co-sign all checks drawn on this fund.

The PSC Construction Consultant will assist with the elaboration of all construction specifications, calls for bids, evaluation of submissions, and the letting of construction contracts until the arrival of the long-term technical assistance team.

The assistant General Development Officer will be in overall charge of the project for USAID and will oversee the work of the contract project administrator and furnish legal Project Officer signatures where required for official documents.

The USAID/REDSO/WCA staff will be required to provide regular legal services to the Mission during implementation of the population resettlement.

Should the DH engineering position in USAID/Bamako be vacant, the USAID/REDSO/WCA engineering staff will also be required to provide regular engineering services to the project, particularly to inspect completed construction work and authorize payment. In the project implementation plan, regular visit to Bamako by the REDSO staff has been programmed every three months.

Technical assistance may also be contracted directly by AID using both Program Development and Support (PDS, i.e., PM&R) funds and project funds to assist with the preparation of bid documents for the construction activities, as jointly determined necessary by the RPU and AID.

4.2 TRIMESTER SCHEDULE OF MAJOR IMPLEMENTATION EVENTS

AGENT	ACTIVITY	FY84				FY85				FY86				FY87				FY88				FY89			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AID	Submission of PP to Malian and American Government																								
AID	Employment of PSC Project Administrator																								
AID	Preparation of PIO/ts for TA (PM&R funded) to help do bid documents																								
AID	Compilation and advertisement of RFP for technical assistance to RPU																								
GRM/AID	Establishment of bid documents for offices, lodging, warehouses, and infrastructure																								
AID	Preparation of PIO/Cs for commodity purchase																								
AID	Preparation of project agreement																								
GRM/AID	Negotiation and signature of project agreement																								
AID	Contract with Genie Rural to do work plans for track and field clearing																								
GRM	Recruitment of contract support personnel for RPU																								
GRM/AID	Establishment of specifications documents for wells and village construction																								
AID	Contract with local A&E firm to control construction of offices and lodgings																								
AID	Call for bids for wells construction and village housing																								
GRM/AID	Contract, construction of offices, housing, warehouses, infrastructure																								
AID/GRM	Negotiation, contract, arrival of technical assistance team																								
GRM/AID	Negotiations and contracts for wells, tracks, and field clearing																								
GRM	Archaeological survey																								
Contractor	Construction of tracks begins, continues																								
Contractor	Construction of village infrastructure																								
Contractor	Construction of wells begins, continues																								
GRM	Epidemiological/Nutritional Survey																								
GRM	Establishment of tree nursery																								
Contractor	Field clearing at new sites for villages to move in 1986																								
GRM	First half of villages transfer																								
WFP/GRM	World Food Program commodities delivered to villages moved																								
Contractor	Field clearing at sites for villages to move in 1987																								
GRM	Second half of villages transfer																								
WFP/GRM	World Food Program commodities delivered to villages moved in 1987																								

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4.3 DETAILED IMPLEMENTATION SCHEDULE

TRIMESTER/FY	AGENT	ACTION
4th/84		<u>Temporary Base at KKK</u> Bids requested
4th		<u>Temporary Base at KKK</u> draft contract
4th		<u>Offices, houses, warehouses</u> request bids CK. W/moa on use of warehouse at Mahina
4th		<u>Road Construction</u> PMR signs agreement. W/GR PIO/T 9/25
1st/85		<u>Temporary Base at KKK</u> Contract signed Oct 1
1st		<u>Temporary Base at KKK</u> Work begins Oct 15
1st		<u>Offices, houses warehouses</u> - review bids Oct 30 - select contractors. Dec 01 - mobilization - draft
1st		<u>A&E Contract for office, lod.</u> - sign contract. Nov a) finalize agreement with ECBM b) draft contract c) sign contract
1st		<u>Road Construction</u> - Eng. arrives 9/25 - road study Oct 01 - FAR finalized
1st		<u>Wells Construction</u> - FAR signed - GRM/DH Agreement - mobilize and begin works
1st		<u>Cisterns (op. puits)</u> - FAR signed Oct 30 - GRM agreement - Op. Puits mobilize and begin - UNDP sign tmg agreement

1st	<u>Construction of new villages</u> - RFB for designs Oct 30 - Select A&E, Dec. 01
1st	<u>Social Infrastructure</u> - RFB for designs, Oct. 30 - select A&E. Dec.
1st	<u>Demarcation of Reservoir Limits</u> - draft T.O.R. PIO/T, Oct.30 - select agency and sign contract, Dec. 01 - begin of study, Dec. 30
1st	<u>Recruitment of Malian Contract Personnel</u> - finalize job descriptions - Place announcements - Hire: 2 secretaries, 3 junior accountants, 1 stockclerk, 2 drivers, 1 watchman - Sr CDAS - Jr CDAS - 1 sect.
1st	<u>World Food Program (PAM)</u> - a) sign agreement W/PAM b) finalize agreement on warehouses
1st	<u>Archaeological Survey</u> - draft T.O.R. - select agency for study - sign contract
1st	<u>Health Survey</u> - side letter GR2-USAID. MOH - commodities ordered
1st	<u>Technical Assistance Team</u> - FRB. Oct 30 - Review bids, Dec. 01 - Select contractor, Dec.
2nd/85	<u>Temporary Base at KKK</u> - FRM installed at KKK
2nd	<u>Offices, houses, warehouses</u> - begin construction. Jan 01 - guest quarters finished, March - 5 offices finished, March

2nd	<ul style="list-style-type: none"> - main warehouse completed <u>Road Construction</u> - mobilization, Jan. - begin Seg. A. - Feb - begin Seg. B.
2nd	<ul style="list-style-type: none"> <u>Wells construction</u> - drilling 6 wells - Jan. - 6 wells - 6 wells
2nd	<ul style="list-style-type: none"> <u>Cisterns</u> - begin construction, Jan. - 10 cisterns finished
2nd	<ul style="list-style-type: none"> <u>Construction of New Villages</u> - design ready, Jan. - RFB for work - select contrat
2nd	<ul style="list-style-type: none"> <u>Construction of New Villages</u> - social Issue monitoring plan estd and reviewed, Jan. - Village committees estd, Feb. - PLAC committee visits Sélingué
2nd	<ul style="list-style-type: none"> <u>Social Infrastructure</u> - designs ready, Jan. - RFB for work - evaluate bids - award contract
2nd	<ul style="list-style-type: none"> <u>Demarcation of Reservoir Limits</u> - end study
2nd	<ul style="list-style-type: none"> <u>Recruitment of Malian Contract Personnel</u> Hire: 16 watchmen <li style="padding-left: 2em;">2 janitors <li style="padding-left: 2em;">2 secretaries <li style="padding-left: 2em;">3 drivers <li style="padding-left: 2em;">1 warehouseman <li style="padding-left: 2em;">1 draftman <li style="padding-left: 2em;">3 construction technicians
2nd	<ul style="list-style-type: none"> <u>Archaeological Survey</u> - begin survey, Jan. - end of survey, March
2nd	<ul style="list-style-type: none"> Health Survey

2nd	<ul style="list-style-type: none"> - FRM and GRM agreement <u>Tree Nursery</u> - draft TOR - FRM signs agreement W/E + F
2nd	<ul style="list-style-type: none"> <u>Technical Assistance Team</u> - sign contract - technical A. Team arrives
3rd/85	<ul style="list-style-type: none"> <u>Offices, houses, warehouses</u> - all offices finished, Apr. - all houses finished - Base completed, June
3rd	<ul style="list-style-type: none"> <u>Road Construction</u> - begin Seg. C. - begin clear site I
3rd	<ul style="list-style-type: none"> <u>Wells Construction</u> - 6 wells, Apr. - 6 wells, May - 6 wells, June
3rd	<ul style="list-style-type: none"> <u>Cisterns</u> - begin maint. Trng, Apr. - 10 cisterns finished, June
3rd	<ul style="list-style-type: none"> <u>Construction of New Villages</u> - mobilize, Apr. - construction begins, May - 2 villages completed, June
3rd	<ul style="list-style-type: none"> <u>Social Infrastructure</u> - agreement with MOE, MOH, E+F to staff
3rd	<ul style="list-style-type: none"> <u>Tree Nursery</u> - plot identified - begin nursery
3rd	<ul style="list-style-type: none"> <u>Master Settler List</u> - complete M.S. List
4th/85	<ul style="list-style-type: none"> <u>Road Construction</u> - end Seg. A., Jul. al A&E firm, - end Seg. B.
4th	<ul style="list-style-type: none"> <u>Cisterns</u> - maint. trng., Jul.
4th	<ul style="list-style-type: none"> <u>Social Infrastructure</u> - begin construction, Jul.
4th	<ul style="list-style-type: none"> <u>World Food Program, (PAM)</u> - request 1st grain shipment,

Sept.

1st/86

Offices, houses, warehouses
- begin warehouses, Oct.

1st

Road Construction
- begin Seg. D., Oct.
- begin LCI, Oct.
- end Seg. C., Dec.
- end Seg. D., Dec.
- end Site I., Dec.

1st

Wells Construction
- 6 wells, Oct.
- 6 wells, Nov.
- 6 wells, Dec.

1st

Cisterns
- 10 cisterns, Nov.
- maint. trng., Dec.

1st

Construction of New Villages
- radio announcement to save
thatch for roofs, Oct.
- 10 villages completed

1st

Social Infrastructure
- infrastructure for 12
villages complete, Dec.

1st

Soil Analysis
- determination on necessity
for soil analysis, Oct.

2nd/86

Offices, Houses, Warehouses
- warehouses completed, Jan.

2nd

Road Construction
- begin Seg. E., Jan.

2nd

Wells Construction
- 6 wells, Jan.
- 6 wells, Feb.
- 6 wells, March

2nd

Cisterns
- 10 cisterns
- maint. trng.

2nd

World Food Program (FAM)
- 1st shipment arrives, Jan.
- request 2nd Shipment, Jan.

2nd

Health Survey
- health survey, Jan.

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2nd	<u>Transfer of Populations</u> - advertise, Feb. - review bids - rent trucks, March
3rd/86	<u>Road Construction</u> - end Seg. E. - clear site 2
3rd	<u>Wells Construction</u> - 6 wells, Apr. - 4 wells, May
3rd	<u>Cisterns</u> - 5 cisterns - maint. trng
3rd	<u>Construction of New Villages</u> - 17 villages completed in New Bamafélé
3rd	<u>Social Infrastructure</u> - infrastructure for 17 villages complete, Apr. - staff for infrastructure in place, June
3rd	<u>Transfer of Population</u> - begin move, May
3rd	<u>Evaluations</u> - TOR evaluation
4th/86	<u>Road Construction</u> - end site 2, July
4th	<u>World Food Program (PAM)</u> - 2nd shipment arrives, July - request 3rd shipment, July
4th	<u>Transfer of Population</u> - end move, July
4th	<u>Evaluations</u> - recruit evaluation team, July - mid-term evaluation, Sept.
1st/87	<u>Road Construction</u> - begin Seg. I., Oct. - end Seg. I. begin Seg. J., Dec.

1st	<u>Construction of New villages</u> - 20 villages completed- 5 hamlets, radio announcement to burn thatch, Oct. - 10 hamlets, Dec.
1st	<u>Social Infrastructure</u> - infrastructure for 20 villages, Oct.
1st	<u>World Food Program (PAM)</u> - analysis of 1st harvest and extra-help if necessary, Oct.
2nd/87	<u>Construction of New Villages</u> - 25 villages completed, Jan.
2nd	<u>Social Infrastructure</u> - infrastructure for 25 villages, Jan.
2nd	<u>World Food Program (PAM)</u> - 3rd shipment arrives, Jan. - request 4th ship., Jan.
3rd/87	<u>Transfer of Population</u> - advertise, Feb. ali, support - review bids, Feb. - Rent trucks, March
3rd	<u>Road Construction</u> - begin site IV, May - end LCI, June
3rd	<u>Construction of New Villages</u> - 30 villages, 18 hamlets completed, Apr.
3rd	<u>Social Infrastructure</u> - infrastructure for 30 villages, Apr. - staff for infrastructure in place, June
3rd	<u>Tree Nursery</u> - 1st Sale of saplings, June
3rd	<u>Transfer of Population</u> - begin move, May - end move, June
4th/87	<u>Road Construction (PAM)</u> - end site IV, July - end Seg. J., July

4th	<u>World Food Program (PAM)</u> - 4th shipment arrives, July - request 5th shipment, July
1st/88	<u>Road Construction</u> - begin Seg. H., Oct. - end Seg. H., Dec. - begin Seg. F., Nov. - begin LCII, Oct. - begin LCIII, Oct.
2nd/88	<u>Road Construction</u> - begin Seg. G., March
2nd	<u>World Food Program (PAM)</u> - 5th shipment arrives, March - request for 6th shipment, March
3rd/88	<u>Road Construction</u> - end Seg. F., May - begin site III, May - end Seg. G., June - end Site III, June - end LCII, June
3rd	<u>Evaluations</u> - TOR for final evaluation, May - Recruit team for eval., June
4th/88	<u>World Food Program (PAM)</u> - 6th shipment arrives, July
4th	<u>Master Settler List</u> - turn over Project goals to GRM, Sept.
4th	<u>Evaluations</u> - final evaluation, Sept.
1st/89	<u>Road Construction</u> - begin LCIV, Nov.
2nd/89	<u>Road Construction</u> - end LCIII, March
3rd/89	<u>Road Construction</u> - end LCIV, June

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5.0 PROCUREMENT PLAN

5.1 POLICY AND RESPONSIBILITIES

To help ensure appropriate commodity procurement and to speed the process, USAID/Bamako will seek unconditional waivers of the Federal Procurement Regulations to locally purchase all vehicles.

All other procurement contracts for services or commodities will be competitively bid according to regulations. Justifications for the waiver request for vehicle purchase may be found in Section 8.2.

Construction contracts for the offices and housing will be bid by locally-owned private sector construction companies, some of which have already executed sub-contracts to build offices and housing for ECBM (the dam contractor). It is expected that local firms will make more competitive offers than offshore bidders.

In view of lower costs, quicker delivery, and the need to get the RPU installed at the project site as quickly as possible, it is deemed prudent to procure house and office furnishings, including 220 volt appliances, locally.

Locally-purchased vehicles will be the same brand and model (Toyota c-60) as those used by both the dam contractor (ECBM) and the OMVS staff at Manantali. A repair capability for these already exists at the job site. The RPU will not be required to stock a large inventory of spare parts for project vehicles. It is assumed that truck rentals for moving people to their new sites will be best procured locally through competitive bidding.

Specialized technical or office equipment not available in Mali or available only at significantly higher cost will be procured from U.S. sources.

Preparing procurement documents will be the responsibility of the RPU. Until the arrival of the technical assistance team, the PSC project administrator and the Management Office of USAID/Bamako will help with this task.

The procurement of all services and commodities will be the responsibility of the USAID Management. Exceptions to this policy will be contract support personnel and office supplies, which will be procured directly by the RPU.

The procurement process will be initiated prior to project authorization with the preparation of bid documents and implementation orders (PIO/TS, PIO/CS) for those items for which specifications have been already determined (cars, motorbikes, furnishings, appliances). RPU personnel currently based in Bamako will help put together the necessary papers. Staffers already have some experience in this process, having done some procurement with UNDP funds according to UN regulations.

The USAID mission contract specialists, the PSC project

administrator, and REDSO/WCA contract officers will assist the RPU in the preparation of bid documents and specifications, advertising, and judging submissions. REDSO legal personnel will examine all procurement contracts for adherence to U.S. government regulations and form.

All contracts for local purchase will be let only after advertising for a call for bids for specific lots to ensure proper supplier competition and reasonable prices. Three submissions will be required for lots to be purchased locally.

U.S. procurement will be the responsibility of the USAID/Bamako management office with assistance from the RPU personnel and project administrator. Allowing for necessary competition as required by U.S. law, the most efficient means of procurement would be to make commodity purchases through a U.S. consulting firm with proven performance to provide procurement services.

Requests for proposals for the provision of technical assistance to the RPU will be specially directed to minority consulting firms.

The means of the Indefinite Quantity Contract will be used to procure the services of short term technical assistance to help the RPU and AID prepare bid documents and contracts for the wells, tracks, village housing, and village infrastructure construction activities.

Contracts for the local procurement of services for the archaeological survey, the epidemiological/nutritional survey, vehicle maintenance, or for the purchase of office supplies, will be administered by the RPU.

5.2. PROCUREMENT LIST

QUANTITY	ITEMS	UNIT COST	TOTALS
5.2.1.	VEHICLES*		
20	Motorbikes, (Camico)	600	12000
2	Locally made canoes	1000	2000
3	Outboard Marine motors	1500	4500
4	Marine fuel tanks (5 gal)	100	400
8	Toyota 4-door all-terrain C-60, diesel engine	15000	120000
8	Spare parts (various)	2000	16000
1	Peugeot pickup plus parts	10000	10000
1	Mercedes 10 ton truck	40000	40000
	(SUBTOTAL)		(204900)

*Note: The Toyotas will all be based at Manantali for use by senior project personnel. The Peugeot will be based at the Bamako antenna office. The motorbikes are for use by the CD agents, both RPU and village-based, for junior personnel in the RPU (draftsman, accountant, chief warehouseman, secretaries). One of them is also meant for liaison and light delivery for the

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Bamako office. No provision has been made to furnish drivers, other warehousemen, or guards with personal transport. The canoes are intended to facilitate river crossings in both the dry and rainy seasons. Thus, one might be permanently stationed at Bamafele. Although contracts will be let for most project transport, one truck will be stationed at the RPU at Manantali for various cartage tasks or emergency hauling needs.

5.2.2. OFFICE EQUIPMENT*

2	IBM Personal Computers with Epson MX100 printers, software	5000	10000
7	Electric typewriters with French keyboard equal to IBM Selectric III model 6705 220V 50HZ	1300	9100
10	Manual Typewriters with French keyboard equal to Hermes Ambassador	800	8000
3	Photocopiers, regular paper maximum print 10 1/8" x 14", 220V 50HZ equal to 3M Secretary II Beta	6000	18000
2	Duplicators, electric/manual operation equal to GEHA model 580DA 220V 50HZ	3000	6000
5	Electric calculators, programmable, equal to Tex-Inst 59	300	1500
1	Drafting table, adjustable, equal to MacMaster Carr #1332T4	300	300
2	Vehicle transceivers equal to Southcon SC-130D Patrol-fone with mobile options	4500	9000
2	Base station transmitter/receivers equal to Scientific radio SR-204 (with power supply, high stability oven selectable LSB-USB, squelch, clarifier, AM filter, blower, dipole antennas)	2500	5000
1	Fuel tank (diesel, 5000 liters)	3000	3000
(SUBTOTAL)			(69900)

*Note: Five electric typewriters, four calculators, two copy machines, one duplicating machine, and the drafting table and equipment will be used in the RPU offices at Manantali. One of each of the machines will be located in the Bamako antenna office. The manual typewriters will be located in the central and site warehouses. One base station transmitter will be placed

at Manantali and one in the Bamako office. One mobile radio unit will be placed in the vehicle of the RPU director and one will be placed in the vehicle of the chief of party of the technical assistance team. The fuel tank will be at the RPU office. Both microcomputers will be at the RPU office at Manantali. One of them will be reserved exclusively for use by the Division of Administration and Finance.

5.2.3.

OFFICE FURNISHINGS*

20	Desks, double pedestal 60"x30" top, equal to Baigleman's C/NE4-33055	400	8000
6	Desks, typing station type with left return equal to Baigleman's C/NE4-32466R and E4-31831L	500	3000
20	Swivel armchairs with fabric seat equal to Baigleman E4-10-TB-FS	150	3000
6	Secretarial posture chairs with fabric seat equal to Baigleman's E4-12-TB-FS	100	600
7	Work tables, 18"x60", wood grain plastic top and brushed chrome legs equal to B's E4-7616-01-16	150	1050
14	Visitors chairs with fabric seat equal to B's E4-11-TR-FS	75	1050
10	File cabinets with 4 drawers, legal 52" high, equal to Baigleman's E4-38-IC-K	250	2500
12	Bookshelves, 47"x12 5/8", 3 shelves equal to Baigle- man's E4-S48A-K	175	2100
20	Air Conditioners, 220V 2HP, equal to Airwell model May 243	600	2000
18	Ceiling fans, 3 speed, 220V 50HZ similar to Sear's model 34	150	2700
8	Metal tables (Metal Soudan type with one drawer)	125	1000
20	Metal chairs (Metal Sou- dan type)	10	200
(SUBTOTAL)			(37200)

*Note: All the above office equipment will be located at Manantali except the following: Two desks, two swivel chairs, one secretarial desk and chair, one work table, four visitor chairs, one file cabinet, two bookshelves, three air conditioners, and three ceiling fans, which will be purchased for the Bamako office; one metal table and two chairs, which will be located at each of the warehouses; one file cabinet which will be placed at the central warehouse. The procurement list reflects allowances for breakdown or damage and for the needs of TDY personnel to

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have a place to work, both at Manantali and in Bamako.

5.2.4 HOUSE FURNISHINGS*			
10	Dining room set equal to White Craft's Cay Sal/ Valencia	2000	20000
10	Living room equal to White Craft's Cay Sal	2000	20000
13	Bedroom sets with 2 twin beds equal to White Craft's bedroom II cane	2000	26000
9	Bedroom sets with bunk beds, one over the other	1000	9000
4	Bedroom sets with single bed, lamp, dresser	1000	4000
10	Freezers, 220v 50 cycles	900	9000
10	Refrigerator/Freezers, equal to G.E. model TBF15SB, 220v 50 cycles	800	8000
10	Stove/oven, four burner, electric	600	6000
(SUBTOTAL)			(102000)

*Note: These are intended to furnish ten project staff houses and seven transient guest bedrooms that will have a common kitchen/dining facility.

COMMODITIES TOTAL 414000

5.2.5. OTHER

Furniture and equipment for the health posts will be financed by the project at a cost of approximately \$44000. Materials and equipment to conduct the epidemiological/nutritional survey will likewise be provided by project funds and are included in the survey cost estimate of \$65000. A procurement list for the health activities may be seen as an attachment to the health activity analysis, Annex 7.7. A complete and detailed equipment list is currently being compiled by the SDPT and AID/Bamako health advisors.

Note: The above commodity list was drafted during project design. Before implementation begins, a more complete commodity list will be drafted, reflecting changes made during project approval process. This revised procurement list will be sent to AID/W separately.

6.0 EVALUATION PLAN

Two evaluations -- a mid-term and a final -- are planned for this project and proper budget allowances have been estimated to fund the evaluations. The mid-term evaluation will be performed by a multi-disciplinary team and will take place in project year three (FY86). Its objective will be to check project achievements against planned activities and to supplement on-going monitoring efforts. Most importantly, it will provide an objective outside-the-project assessment of the state of implementation and suggest any changes in the planned execution of activities or personnel mix deemed necessary by the evaluators to achieve the project purpose in the best possible manner. The team will thus be required to judge the performance of GRM civil service and contract personnel, the expatriate technical assistants, and the project activity contractors, both government agency and private firm as the case may be.

The final evaluation will be done in project year five (1988) by a similar multidisciplinary team. Its objective will be to assess the entire resettlement effort, to identify successes and shortcomings, to determine what if any additional activity or support is necessary, and to suggest a model for the planning and execution of forced population resettlement.

The evaluation teams will include a financial analyst/accounting experts, a socio cultural anthropologist or rural sociologist with Sahelian experience, a public health specialist familiar with health problems in the Sahel, a civil engineer with construction experience, a wells construction specialist, a road engineer familiar with rural tracks construction in West Africa, and an agronomist, a livestock specialist, and a forester with experience in Sahelian production systems. Due to the broad nature of the project and many activities to be assessed, as well as the logistical and scheduling problems such a large team will pose, it is suggested that individual efforts be staggered over three months time in each of the evaluations. It is expected that about six weeks, including document study, interviews, field visits, and write-up time, will be required from each specialist.

The active participation of Malian personnel unconnected to the RPU and the National Hydrogeological Service will be sought. Therefore, the exact nationality makeup of the team should be jointly determined by USAID and the GRM to include an objective mix of government and private sector expertise.

A total of 20 person months has been budgeted for the evaluations, reflecting cost estimates which cover both expatriate and Malian evaluators. However, an alternative which could lower evaluation costs would be to advertise the evaluation task and call for proposals/bids from potential agencies or firms capable of doing it.

7.1 ANNEX: THE EVOLUTION OF SITE SELECTION/TRANSFER PLAN

7.1.1 INTRODUCTION

7.1.2 PRESENT VILLAGE SITES

7.1.3 EARLY VILLAGE GROUPINGS AND SITE PREFERENCES

7.1.4 PRELIMINARY SITE IDENTIFICATION

1. Land Availability
2. Water Availability
3. Health Considerations
4. Environmental Considerations
5. Resettlement Zones, Village Groups, and Village Site Proposals
6. Policy for Host Villages
7. Transfer Plan

TABLES

- I. Elevations of Existing Villages
- II. 1977 Proposed Groupings/Site Preferences
- III. Evolution of Site Preferences
- IV. Design Team Proposed Sites/Groupings/Year of Move

7.1.1 INTRODUCTION

Many important criteria were considered when selecting zones and village sites for resettlement. The general approach to preliminary site identification was to study available information to determine what additional data was needed, to rely on the judgment and desires of the resettled and receiving village populations, backed by an interdisciplinary team of technical advisors in the areas of water supply, soils and crops, health, economics, and anthropology. It is obvious that specific village sites and resettlement zones will never be ideal from all perspectives. This requires each discipline of the advisory team and the villages to work together in harmony and constant coordination, and retain a large degree of flexibility in order to accommodate changing priorities, problems and make compromises. Site selection is one of the most important steps in the resettlement process because it will largely determine the future of these villages in the domains of water supply, land availability, health conditions, access to markets, and services.

7.1.2 PRESENT VILLAGE SITES

One of the first steps in site selection was to determine which villages would have to be moved due to the flooding of their present sites by the reservoir to be created by the dam.

The limit of the reservoir as calculated by the consulting engineers for dam construction, Groupement Manantali, is shown in Map I. The normal high water elevation of the reservoir has been designed at 208 meters, with a 100-year flood level of 209.5 meters and a 1000-year flood level of 210.5 meters. Villages below these levels should safely be located above the 210 meter contour line. Table I shows the present elevations at which project villages are situated according to benchmarks and contour lines indicated on the 1/200,000, 1/50,000 and 1/20,000 scale topographic maps. A total of 59 villages and hamlets will be directly affected by the dam construction. It has thus far been determined that thirty villages and fourteen satellite farming hamlets will have to be moved. Five villages and three hamlets will be hosts, in the sense that their croplands will be affected by relocating villages. Seven villages originally thought to have to move are located on high ground but their fields will be affected by flooding. These villages are situated above the elevation of 210 meters:

<u>Right Bank</u>	<u>Elevation</u>
Nounkala	221 (already moved approximately 1 km. from its former site)
<u>Left Bank</u>	
Solo	247
<u>Southern Zone</u>	
Kologo	232
Diba	218
Koba	229
Sitaninkoto	221
Sitafeto	225

These villages have been included in the resettlement planning because portions of their fields may be flooded out or the village may be cut off and isolated by the surrounding mountains and future reservoir.

There is no information available, however, as to the extent to which fields will be flooded or access roads cut off since no demarcation of the limits of the reservoir shoreline has been done to date. Thus, precise location of the shoreline in the early stages of resettlement is necessary in order for villagers and technicians to make informed decisions about location of fields in the upstream area. The areas immediately concerned are sections of the eastern, western and southern boundaries of the lake, to be further discussed below.

7.1.3 EARLY VILLAGE GROUPINGS AND SITE PREFERENCES

The 1977 Groupement Manantali study suggested reducing the number of villages by amalgamating them into larger centers where the provision of certain social infrastructure would be justifiable. This would be the most economical method of introducing services into an area which is practically barren of any such infrastructure. The study proposed to regroup 40 villages and hamlets into one principal center of 2,600 inhabitants, three secondary centers of 1,300 inhabitants and seven villages of 300-700 inhabitants, with infrastructure to be included relative to the size of the center. Two resettlement zones were identified and site plans included for each center.

The USAID PID document of March 1982 was based upon a review of the 1977 Groupement Manantali study and joint GRM/USAID missions to the project area in December 1981 and January 1982. The PID retained the basic principal of amalgamation but modified and updated the locations of the proposed resettlement zones and the composition of the village groupings to reflect more accurately the preferences expressed by the villages. The PID proposed the formation of 12 main villages to be regrouped between four resettlement zones. The sizes ranged from 438 to 2,259 inhabitants.

The PID approval and guidance cable deemed economic development activities inappropriate in the project due to relevant experiences with other new lands settlements. As the project life coincides with a transitional stage of resettlement only, i.e. sensibilization, mobilization, construction, moving and settling in, the project designers were instructed to concentrate on assuring the re-establishment of the previous level of economic activity with the least disruption possible of traditional social and agricultural patterns. Thus, the concept of amalgamation of villages needed to be reviewed since its provision for socio-economic infrastructure had been deleted from project goals.

As the UNDP financed studies got underway in early 1983, interviews with project villages reflected a gradual change in preferences for groupings and prospective resettlement zones. This can be explained by several factors:

1. An awakening realization by the villagers that relocation is a fact.
2. The visible impact of construction activities at the dam site.
3. The economic impact of wages of men from project villages employed on the dam construction.

Political awareness of certain villages to try to maximize economic and political benefits from the relocation.

Conflict of interest within villages regarding groupings and site choices because of family ties, perceived agricultural potential, or economic and infrastructure benefits from the dam.

Another factor is the original impetus for regrouping as presented by the 1977 study. Original village groupings and site preferences are shown in Table II. These choices were made in response to two significant questions:

• Would they accept to live together in a larger village, with a school, dispensary, store...but on the condition to live with others?

If not, why, and if yes, with whom?

Most villages responded affirmatively, but perhaps without fully understanding the concept of amalgamation. Further inquiries during later studies revealed more of a desire to remain autonomous, keeping individual village identity and following personal village desires, rather than be identified as a collectivity. The progression of changes are illustrated in Table III, where the twelve PID groupings of 1982 break into 24 groupings, which are then geographically redistributed into 14. Geographic zones since the PID remain basically the same, except for a gradual "creeping" towards the dam site, or villages which decided to change sides of the river, or remain near their present sites.

In addition to these changes, it was also necessary to reconsider individually the case of each village located above the 210 contour to determine whether or not the village would be forced to move. Recommendations for each case were as follows:

- Solo - With a population of 935 inhabitants, it is the largest village in the Bafing zone. The village itself is located well above the limit of the future reservoir, but risks innondation of fields which extend towards the river. Further investigation revealed, however, that most of their fields lay on the road west to Kama, and in hamlets south. The problem of isolation was also considered, as the mountains and future reservoir would completely cut off the village from the north and the other Bafing villages to be moved downstream. Upon consultation with the village as to the problem of access, it was found that they are on the border of the Bafing and Sunkama cantons, and equally have family ties with Kama as with Bafing villages. A passable road exists between Solo and Kama, as well as available fields to replace those to be innondated. A possible north-south passage exists by footpath from Sandiguila, a hamlet of Solo, which continues 15 kms north to another hamlet Toumania, becoming a road made by villagers for the evacuation of agricultural produce, which continues for approximately 25 kms to the village of Nantela, the first resettlement zone downstream on the left bank of the river. Given the villagers preference to remain in place, it was recommended that Solo not be required to move.

Kologo - The village is safely located above the future reservoir limit, but some fields may be flooded. There is no access problem as they are located on the road to the local government seat, Kokofata. It was recommended that the village not be required to move, but new fields must be identified.

Koba - In the same situation as Kologo and the same recommendation was made.

Sitaninkoto - The village is located near the river, but is safely above the future reservoir limit. More fields risk flooding than its neighboring villages, but the majority of its fields are located further south on the river. The same recommendation is made as for Kologo and Koba.

Diba - The village is located not only on the main river, but near a major stream off the river. The village will not be flooded, but many of its fields are along the rivers. It is not yet known what percentage of its fields will be flooded, nor the availability of sufficient quantities of land for replacement close by. More complete information is needed to make a final decision.

Sitafeto - Also along the river and in the same situation as Sitaninkoto. The same recommendation is made as for Sitaninkoto.

Even though these villages will probably not be required to move, the following factors must still be taken into consideration:

1. The quantity of fields to be flooded out must be determined, and zones for new fields identified.
2. Though water will not flood these villages, those which use river water for their domestic water supply or which will be inclined to as the reservoir fills should be included in the water supply component. The quality of water will change as the reservoir fills and passes over soil and vegetal matter, as opposed to solid river bedrock which is presently the case.

7.1.4 PRELIMINARY SITE IDENTIFICATION

Technical information considered essential to aiding the villages in site selection was provided by the UNDP financed studies in the areas of water, soils, and socio-economics, in order to assure:

- land of sufficient quantity and quality to support the population immediately and in the future;
- water in sufficient quantities and quality (if not better) to support the population;
- access to future markets and regional development;
- integration without conflict with people already living in the resettlement zones.

Site selection was based upon villager living preferences, and the results of the technical studies, reconfirmed by the villages, and then submitted to the local administrative authorities for approval.

Review of the technical studies and field investigations by Mission personnel addressed the following issues:

1. Land Availability

Resettlement zones must be large enough to avoid land tenure conflicts. The limit of village lands are generally well known. Attribution of new parcels would be made according to Malian law in collaboration with the "land chief" of the host village and the relocating village. The quantity and quality of land must be comparable to the land being left behind and suitable both for traditional and modern practices. Each village has its territory composed of cultivable land, fallow land, rice fields and woodlands. Garden areas around each household are cultivated by women, as well as gardens along streams.

The Agricultural Analysis in Annex 7.6 verifies that there is no land problem in the identified resettlement zones. In general, the soils study provided enough favorable information to allow for a preliminary evaluation of the resettlement zones and localizing of new village sites. Information from the detailed phase of the soils study is needed before selections can be finalized.

2. Water Availability

The hydrogeological conditions of the potential resettlement zones are discussed in the Wells Annex 7.2.4. Water has been found in sufficient quantity and quality for domestic use at depth in fracture zones.

3. Health Considerations

According to the Public Health Analysis in Annex 7.7 new village sites downstream from the dam should be located at least two kilometers away from the river and 5 kilometers from known breeding sites, due to the possible increase in onchocerciasis. With one half of the project villages choosing downstream resettlement zones, this placed a restriction on those villages presently living along the river wishing to relocate alongside the river again. This guideline was respected in all preliminary site planning.

4. Environmental Considerations

The size of the village groupings could possibly have a negative effect on the environment as well as cause social pressures in the future when population growth will put demands upon available land. As most villages will be moving to very lightly populated areas, the installation of people, animals and establishing of fields will affect the micro environment and structure of the land. Felling of trees, removal of root systems, burning of bush, and the introduction of micro-organisms which accompany human habitations will change land areas. There is no doubt that these areas will be able to support the changes, but measures to minimize the negative

effects must be taken. Degradation of the natural environment by large population concentrations must be avoided. Large village groupings must also take into consideration that in the future expansion of villages, land will become the most valuable resource. It was therefore recommended that a buffer zone of at least a kilometer be kept between villages within a grouping. The importance of land and the distinction of different types is discussed in the Social Soundness Analysis in Annex 7.4.

5. Resettlement Zones, Village Groups, and Village Site Proposals

Before preliminary sites were proposed to villages, specific policies were set by the Administration as further guidelines:

- Villages would not be allowed to settle on the piece of land given to the builders of the dam by the Malian Government exclusively for the task of construction and future operation (i.e. Soukoutali which planted a sign of a parcel of land next to the dam headquarters).
- Existing separate village units will not be permitted to divide and establish separate villages (i.e. as in the case of Marena which proposed to divide into Marena I, II and III). A village administratively will remain one village. This does not impede villages from establishing farming hamlets.

As a result, ten villages which had chosen sites close to the dam where the river approaches the cliffs (between Bingassi and Manantali) were obliged to fall back upon original choices or alternatives.

With the results of the first phase of the studies and administrative requirements communicated to the villages, new sites were identified, falling within five general zones. Three zones are located upstream on the boundaries of the reservoir, and two are located downstream on either side of the Bafing. These zones are subdivided into seven village groups corresponding to centers of concentration within the limits of the zones (see Map 2). The groups are to serve as the main points of organization for construction, infrastructure and social services (see Village Reconstruction Annex 7.2.5). Each village group is then comprised of individual, autonomous village sites (see Map 3). Twelve of those sites correspond to successful boreholes executed under the DNHE Hydrogeological study. The new village sites and resettlement plan are given in Table IV.

The site choices must be finalized before any village construction activities can begin. The final results of the soils and topographic studies must be available before final evaluation can take place. Once available, village leaders accompanied by a technical team including a soils expert, topographer, and members of the Project Resettlement Unit will inspect the proposed site for a final decision or reconsideration. In the cases of sites identified next to positive boreholes, implantation will be facilitated by the limiting factor of walking distance from the village to the well (usually not more than 500 meters), therefore those villages will be located no greater than at a 500 meter radius from the well.

Final site verification should take place in the dry season of 1984-85 to allow the water supply component of new village construction to begin without delay.

6. Policy for Host Villages

Villages acting as hosts to the populations to be moved are to be considered on an equal basis with the villages they are receiving. They will undoubtedly play an important role of support for the displaced newcomers. In many cases these villages are already linked by common ancestry or through marriages. Where resettling villages are to benefit from certain infrastructure, specifically water points and improved roads, the host village will also benefit from the same infrastructure. This will in a sense serve as an indemnization for the land the host villages will be giving up, as well as prevent jealousy or inequality between villages.

7. Transfer Plan

The move will be organized in two phases. About half of the villages will move in May 1986. This phase includes those villages that will be threatened by the abnormal rise in river level during rainy season 1986 caused by the fourth diversion of the flow to facilitate the dam construction. The second phase will move in May 1987. Every attempt has been made to transfer villages -- according to zone, group, and new site location -- in the same year. The plan listing the villages and year of transfer is seen in Table IV.

TABLE I

ELEVATIONS OF PRESENT SITES

<u>VILLAGE</u>	<u>ELEVATION</u>	<u>VILLAGE</u>	<u>ELEVATION</u>
<u>Right Bank</u>		<u>Left Bank</u>	
Soukoutali	164	Ougoudinko	204
Sekokoto	164	Badioke	174
Keniekenieko	166	Kouroundi	180
Kenieba	160-170	Kilia	
Nigui	184(189)	Solo	247
Farabandi	184(189)	Banbouta	190-200(174-180)
Firia	205(211)	Goungoudala	190-200(215)
Madinandi	189	Tima	213
Nounkala	221		
Topndidji	190-200	<u>South</u>	
Ganfan	180-190	Kologo	232(230)
Kambou	171	Diba	218(217)
		Koba	229(228)
<u>Left Bank</u>		Sitaninkoto	221(224)
Dialakoto	165-170	Sitafeto	225
Souroufouga	165		
Kouroukondi	170	<u>Rivers and Major Streams</u>	
Barlakourou	170-175	Bafing at Soukoutali	156
Tintilla	170-175	Bafing at Kenieba	157
Sandegnan	160-170	Koundia between Kenieba and Tondidji	158
Konkorma	180-190	Bafing at Kambou	160
Bamafele	169	Bafing at Goungoudala	202
Goumbalan	190-200(182)	Souguiiri at Sitaninkoto	206
Marena	170-180(173)		

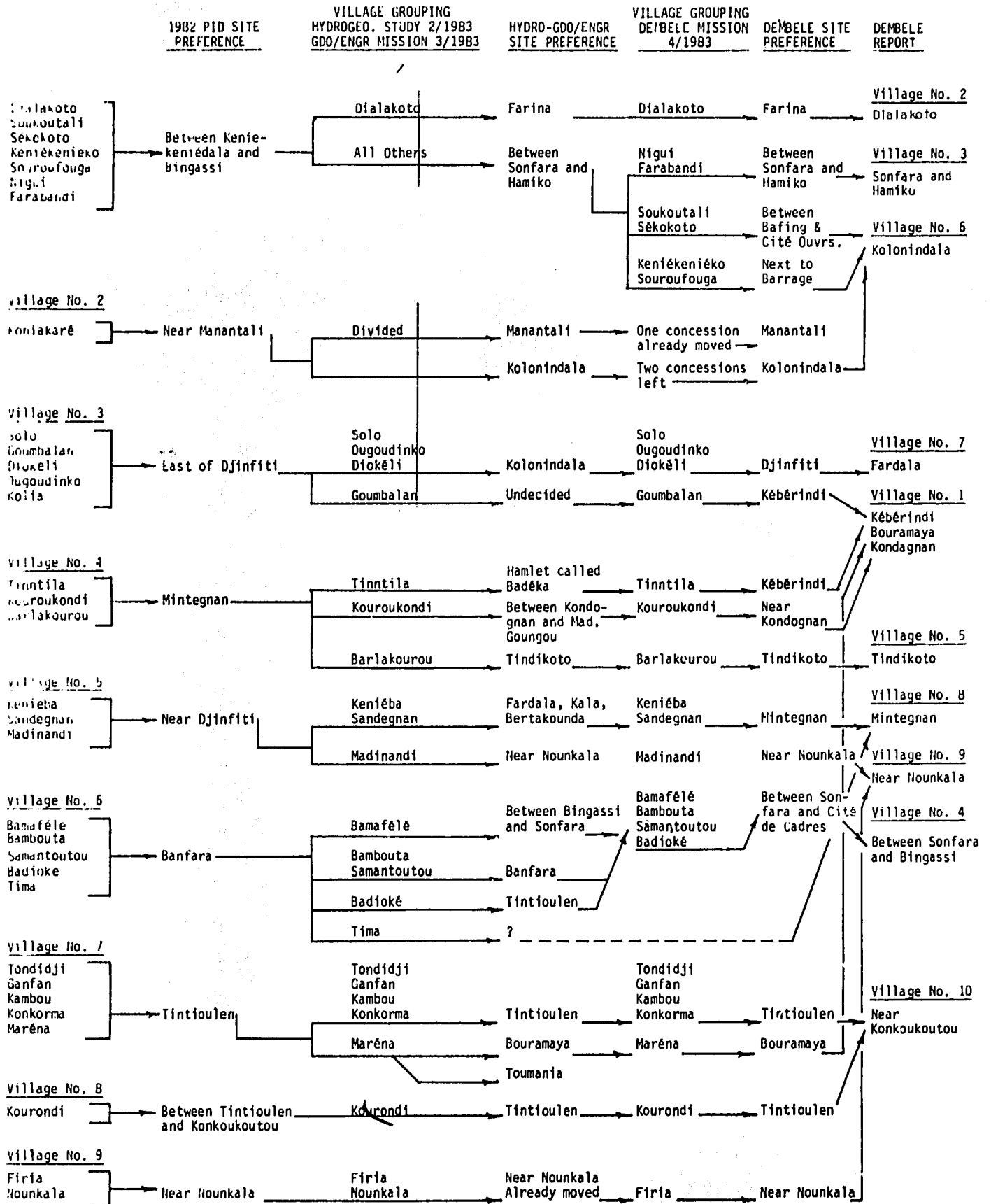
Elevations are taken from 1/200,000, 1/50,000 and 1/20,000 scale maps. Elevations shown in parentheses are where the maps varied.

TABLE II

GROUPEMENT MANANTALI FINAL REPORT 1977 - GROUPING AND SITE PREFERENCES

<u>Village</u>	<u>Original Grouping Preferences - 1977</u>	<u>Original Site Preferences - 1977</u>
1. Soukoutali	Nigui, Farabandi, Sekokoto	Towards Manantali, next to Bafing
2. Sekokoto	Bingassi, Soukoutali, Keniekenieko, Farabandi, Nigui	Towards Manantali, next to Bafing
3. Keniekenieko	Farabandi, Nigui, Sekokoto, Soukoutali	At foot of Simanta, hill 10 kms from present site
4. Kenieba	No preference, want to preserve their name	-
5. Nigui	Farabandi, Keniekenieko, Kenieba, Soukoutali	On the edge of water
6. Farabandi	Keniekenieko, Nigui	On edge of reservoir
7. Firia	Nounkala, Dolikoto, Bokoto, Sarke	Remain in Canton of Gangaran
8. Sandegnan/ (Madinandi)	Barlakourou, Ganfan, Tondidji, Konkorma, Bamafele, Sobela, Kenieba	-
9. Nounkala	Kenieba, Nigui, Tondidji	Next to their mountain
10. Tondidji	Kambou, Ganfan, Konkorma	Remain in Canton of Bafing, in the Tintioulen
11. Ganfan	Tondidji, Kambou	-
12. Kambou	Konkorma, Tondidji, Ganfan, Bamafele, Badioke	-
13. Bamafele	No preference, want to remain the Arrondissement	Closest possible to present site
14. Tintilla	Bamafele, Konkorma, Kenieba, Sobela, Kodegnan, Ganfan, Barlakourou	-
15. Marena	Bamafele, Goumbalan, Ougoudinko, Badioke	Where they can profit from dam
16. Goumbalan	Would prefer not to live with others, to avoid eventual problems with land	-
17. Konkorma	Bamafele, Badioke, Marena, Goumbalan, Ganfan, Tondidji, Kambou	Next to dam
18. Barlakourou	With anyone of the Bafing	-
19. Goungoudala	Bambouta, Solo, Niarekira	West of present site
20. Ougoudinko	Goumbalan, Solo, Badioke, Marena	West of present site, near Toumani
21. Solo	Goungoudala, Bambouta, Badioke	South of present site, as near as possible
22. Bambouta	Goumbalan, Solo	On other bank of Bafing in the same sector
23. Badioke	Bamafele, Goumbalan, Marena, Solo	On edge of reservoir
24. Koba	No preference, but remain equal to others	On edge of reservoir
25. Diba	No preference, but to be first occupants	next to river
26. Kologo	Would prefer not to live with others	-
27. Sitaninkoto	Sitafeto, Kologo, Diba, Koba	-
28. Sitafeto	Farina, Niarekira, Kouroukoto	Next to river

TABLE III
PROGRESSION OF VILLAGE GROUPINGS AND SITE PREFERENCES
Evolution des Groupes de Villages et Préférences de Sites



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TABLE III (continued)

RECASEMENT
MANANTALI
RESETTLEMENT

PROGRESSION OF VILLAGE GROUPINGS AND SITE PREFERENCES
Evolution des Groupes de Villages et Préférences de Sites

1982 PID VILLAGE GROUPING	1982 PID SITE PREFERENCE	VILLAGE GROUPING HYDRO/EO, STUDY 2/1983 GDO/ENGR MISSION 3/1983	HYDRO-GDO/ENGR SITE PREFERENCE	4/1983 VILLAGE GROUPING DEMBELE MISSION	DEMBELE SITE PREFERENCE	DEMBELE REPORT
<u>Village No. 10</u>						
Kologo Diba Koba	Near Balé River Near Reservoir	Kologo	Near Reservoir	Diba Kologo	Between Kaligo-Kourou and Road Koko.	<u>Village No.11</u> Same
		Diba	Near Balé River			
		Koba	Near Fatagania	Koba	Between Kolin-fé, Fatagania, Rd. Bantakoto	<u>Village No.13</u> Same
<u>Village No. 11</u>						
Sitaninkoto Sitaféto	Near Present Sites Southeastern Edge of Reservoir	Sitaninkoto	Near Present Site-Right Bank	Sitaninkoto	Between Pre-sent Site and Bantakoto	<u>Village No.12</u> Same
		Sitafét	Near Present Site-Left Bank	Sitaféto	Between Pre-sent Site and Niarékira	<u>Village No.14</u> Same
<u>Village No. 12</u>						
Goungoudala	None	Goungoudala	Near Balé River or Downstream	Goungoudala	Undecided	With <u>Village No. 8</u>
<hr/>						
<u>Total No. of Village Groups</u>						
<u>1982</u>		<u>2/1983 - 3/1983</u>		<u>4/1983</u>		<u>4/1983 Report</u>
12		24		22		14

TABLE IV

VILLAGE RESETTLEMENT PLAN

<u>ZONE</u>	<u>GROUP</u>	<u>LOCATION</u>	<u>PRINCIPAL VILLAGE</u>	<u>VILLAGES</u>	<u>YEAR OF MOVE</u>
1	1	near Bangassi	Bamafele	Bamafele Samantoutou Nakalouya (H)* Bantandioke Barlakourou Badioke Kolonidala (H) Koniakari Tambafin 1 (H) Tambafin 2 (H) Diobefin (H)	86 87 87 87 87 87 host 87 87 87 87
1	2	near Djinnfiti/ Faradala	Kenieba	Kenieba Bamboua Djinnfiti (H) Ougoudinko Dickeli Domba (H) Kalia (H) Kouroukofe (H) Keniebafin (H) Kodianfe (H) Faradala (H)	86 87 host 87 87 87 87 87 87 87 host
1	3	near Dekelikourou/ Dalafara	Keniekenieko	Keniekenieko Sekokoto Soukoutali Souroufouga Dougoutankoto (H) Liliko (H) Farabandi Nigui	86 86 86 86 86 86 86 86
2	4	between Banfara & Sobela	Sobela	Dialakoto Goumbalan Kondognan Kouroukondi Marena Nantela Sobela Tintilla	86 87 host 86 87 host host 87
3	5	near Nounkala	Madinandi	Firia Dolikoto Madinandi Nounkala Sandegnan	87 host 87 host 87

<u>ZONE</u>	<u>GROUP</u>	<u>LOCATION</u>	<u>PRINCIPAL VILLAGE</u>	<u>VILLAGES</u>	<u>YEAR OF MOVE</u>
4	6	near Tintioulen	Tondidji	Ganfan Kambou Diabougou (H) Sitakoto (H) Konkoroma Kouroundi Tondidji	87 87 87 87 86 86 87
5	7	near Kologo	Goungoudala	Goungoudala Tima (H)	87 87

Note: It is believed that the following villages, originally thought to be required to relocate, will not have to be transferred because they are located at elevations beyond the upper limits of the high water level in the reservoir:

Diba
Koba
Kologo
Nounkala
Sitafeto
Sitaninkoto
Solo

*(H) = Farming Hamlet

7.2.1. ANNEX: PROJECT OFFICES, LODGING, WAREHOUSES.

A prerequisite to undertaking project activities and accomplishing project goals is to assure adequate living and working conditions for the Resettlement Project Unit (RPU) staff and Advisory Personnel. Suitable housing and office space must be furnished in a timely manner to allow RPU and advisory personnel to become functional on-site with minimal delays. Project activities in the field will also require minimal support through the provision of storage facilities essential for the protection of project commodities.

The creation of a base of operations for the dam construction has been completed with housing and offices built for the personnel of the Construction Contractor (Entreprises de Construction du Barrage de Manantali, ECBM), the Consulting Engineers (Groupement Manantali, GM), and the Employers, OMVS. Though the OMVS operation does contain a Resettlement Unit, housing and office space were not foreseen in dam mobilization activities for the USAID/GRM Resettlement Project. OMVS, ECBM and GM were approached as to the availability of extra facilities for rent or purchase, but it was found that the existing buildings have barely covered their own needs.

Certain provisions and options are possible, however, for the USAID/GRM Resettlement Project:

- Parcels of land contiguous to existing Contractor facilities are available for RPU building needs. The offices are to be located next to OMVS offices, RPU and advisory staff are to be housed within the compound of the "Cité des Cadres" or directly next door and RPU support staff (chauffeurs, etc.) can be located within the compound of the "Cité d'Ouvriers".
- Electricity and running water will be supplied by the Contractor on a reimbursable basis (the reason why RPU facilities must be located next to existing buildings - no extension of utilities need be made).
- The Contractor ECBM could handle the construction, furnishing and maintenance of the required buildings, in turn to be leased to the Resettlement Project.
- The Resettlement Project with USAID/Bamako Engineering and Management Office support could contract to have the required buildings constructed, provide furnishings, and arrange for necessary maintenance for the Project lifetime.

Due to time constraints and the management burden foreseen on the RPU and USAID, ECBM has been approached for an expression of interest to assume the construction/leasing role. The Contractor has responded affirmatively, but has not furnished conditions or projected costs. The advantage to this method is that the RPU and USAID would not be burdened with procurement and long-term maintenance. The disadvantage would be the higher cost, as ECBM would subcontract the work to a local Malian firm, as they did with most of their own building construction. This practice would include their overhead in addition to the Subcontractor's overhead.

If to the contrary, the Resettlement Project is required to purchase these services, the building construction can be contracted out to a local firm following standard practices with the Directorate of Rural Engineering (GR) and the support of the Engineering Office. Procurement of furnishings could pass through the Management Office, and maintenance services would be arranged for or purchased at the dam site through the RPU. The advantage to this procedure would be the lower cost and that it could be more expeditious.

The cost analysis addresses construction needs only, with estimated percentages added according to the method of contracting chosen. Furnishings, utilities and maintenance are not included.

A. Design Requirements for Headquarters and Field Support Buildings.

The requirements for the residential quarters and office space for the RPU and Advisory staff, and for the field support buildings are as follows:

1. Ten residential units of which five contain approximately 120 square meters of living space including three bedrooms and contain approximately 100 square meters of living space including two bedrooms. These units are to house the RPU and Advisory staff and shall be located in or near the Cite des Cadres.
2. A guest house/maison de passage with approximately 162 square meters of living space, with seven bedrooms with baths, a common lounge, and kitchen to be located in or near the Cite des Cadres. This building will house USAID and other visiting project related staff.
3. Office space of approximately 188 square meters, divided into thirteen offices, a storeroom, bathroom, and a conference room, with a parking area for 10 vehicles, to be located adjacent to OMVS offices. The offices will be of a simple, functional design and will serve as RPU headquarters.
4. One central warehouse of approximately 200 square meters, for storage of food aid, construction materials and equipment for village reconstruction, and other project commodities. The warehouse will be located near Bingassi at the new site of Bamafele, the Arrondissement, to serve as a central distribution point.
5. Seven site warehouses in the resettlement zones, of approximately 75 square meters divided into two storage areas, for local distribution of food aid (approximately 4.000 tons over three years), storage of construction, materials and equipment during daily operations, and office space for management of on-site resettlement activities.

In general, housing offices and warehouses will conform to the following specifications:

Exterior walls of cement block (15-20 cm) with reinforced corners; interior walls of cement block (10 cm); concrete footings and foundations, or stone rubblework; concrete ground floor slab on compacted fill; reinforced concrete bond beams and columns (in warehouses); steel trusses and purlins with corrugated metal roofing; hung plywood ceilings; metal shutters or metal frames with windows; metal exterior doors; wood interior doors; cement plaster inside and outside; walls whitewashed or painted; bathroom tile; electrical installations and modern plumbing (housing and offices).

B. Architectural and Engineering Services.

Certain restraints are placed upon the design of the RPU housing and office buildings, due to their proximity to buildings already constructed of specific models or styles. RPU buildings should be similar to the design of the existing constructions, to respect the architectural and visual integrity of the established building complexes. Thus, design parameters were established by consulting and adopting plans furnished by the Contractor.

The design division of GR could elaborate the drawings and furnish design details to model plans furnished by ECBM, as well as direct the contracting and supervise the construction. Whether the contracting goes through ECBM or directly to a local firm through GR, all drawings and specifications will be approved by the USAID Engineering Office. In addition, the Engineering Office will follow a program of periodic control of all construction activities.

C. Local Construction Capability.

There are several local Malian firms which are qualified to undertake one or more construction contracts. Local procurement of construction materials will be necessary, as contractors are generally not capable, nor would time permit for the procurement of construction materials or equipment through normal USAID procedures. The cost will also be less than if U.S. construction materials were required.

D. Building Construction Cost Analysis.

The cost analysis is based upon current unit prices and prevalent construction conditions in Mali. Many factors can vary prices; for instance the location of a site will affect transport costs and general logistics, or the uncertain availability of construction materials on the market (e.g. cement, reinforcing steel, roofing materials), and especially the variation in the price of these materials when in short supply, can make it difficult to determine precise unit costs. Given these restrictions, unit prices were arrived at accordingly below.

The unit prices per square meter shown in column A were given by the National Directorate of Construction and Urbanism (DNUC). These tend to reflect the upper limit of local construction rates and are most often found among firms with expatriate personnel to support. The unit prices shown in Column B are average rates per square meter based on several construction contracts let over the past year under the control of the Mission Engineering Office, as well as the construction work already executed by local firms for the personnel housing at Manantali. For this reason, the unit prices in Column B are found to be more reasonable and have been used to estimate the costs of construction. An exchange rate of \$ 1.00 = 750 MF has been used in the calculations of dollar costs.

	DNUC Column A (per m ²)	USAID PRICE EXPERIENCE Column B (per m ²)
1. <u>Modern House Construction:</u> 1st category, containing all comforts - tiled floors, glass windows, modern plumbing and electricity, reinforced concrete and cement block construction	\$ 365.00	\$ 300.00
2. <u>Modern House and Office Construction</u> 2nd category, cement block and stone rubble masonry, corrugated metal roofing on metal frame, plywood ceilings, metal doors and shutters, electricity and plumbing limited.	\$ 275.00	\$ 250.00
3. <u>Semi-Modern House Construction:</u> Exterior walls in cement, interior walls in banco (mud brick), cement plastering. Corrugated metal roof on metal frame, no ceiling, metal doors and shutters, electricity and plumbing limited.	\$ 170.00	\$ 150.00
4. <u>Banco and Masonry Construction</u> Foundations of stone rubblework, walls in banco or stone masonry, cement mortar and plastering. Corrugated metal roofing on wood frame; electricity limited, traditional plumbing (outdoor latrine)	\$ 130.00	\$ 100.00
5. <u>Banco Construction:</u> Entirely in mud blocks, cement mortar and plastering, corrugated metal roofing, no ceiling, no electricity or plumbing, floor of rammed earth.	\$ 100.00	\$ 75.00
6. <u>Traditional Banco Construction</u> Entirely banco construction, roof of vegetal matter (straw thatch), mud mortar and plastering, floor of rammed earth, wood or corrugated metal door. No electrical or sanitary installations, no painting.	\$ 80.00	\$ 40.00
7. <u>Warehouse Construction:</u> Reinforced concrete and cement block masonry, corrugated metal roof on metal frame, sliding metal doors, concrete floor, modern electrical installations.	\$ 327.00	\$ 250.00
8. <u>Warehouse Construction:</u> Cement and stone rubble foundation, cement block masonry for walls, reinforced concrete columns, corrugated metal roof on metal frame, metal doors, cement floor, no electricity.	\$ 300.00	\$ 200.00

A distance coefficient of 20% (according to REDSO/WCA estimates) of the total contract amount is added to the construction cost to cover logistics and transport of materials.

A & E services and surveillance by the GRM Office of Rural Engineering of the work are estimated at 6% of the total contract amount, due to the distance involved and the remoteness of the location.

The preceding prices are expected to hold into early 1984. An inflation factor is not included in the cost estimate as construction should begin by this time for the project to start on schedule. (Note: Both an inflation and contingency factor are included in the budget table 5 seen in Section 3 of the PP).

E. Cost Estimate (in dollars)

1. Housing for PMU and Advisory Personnel.

<u>No. of Units</u>	<u>Type of Unit</u>	<u>Unit Area(m²)</u>	<u>Total Area(m²)</u>	<u>Unit Cost/m²</u>	<u>Cost/unit</u>	<u>Total Cost</u>
5	3 bedroom House	120	240	\$ 300	36,000	180,000
5	2 bedroom House	100	600	\$ 300	30,000	150,000
1	Guest House with seven units with bathrooms and a common kitchen and lounge		112	\$ 300	34,000	34,000

2. Offices for PMU and Advisory Personnel

<u>No. of Units</u>	<u>Type of Unit</u>	<u>Unit Area(m²)</u>	<u>Total Area(m²)</u>	<u>Unit Cost/m²</u>	<u>Cost/unit</u>	<u>Total Cost</u>
2	Office buildings in complex with 12 offices (4x4m), four WCs (2.5m ²), a conference room (4/8m), and store-room (4x4)	125	250	\$ 250	31,250	62,500

3. Warehouses in Resettlement Zones

<u>No. of Units</u>	<u>Type of Unit</u>	<u>Unit Area(m²)</u>	<u>Total Area(m²)</u>	<u>Unit Cost/m²</u>	<u>Cost/unit</u>	<u>Total Cost</u>
1	Central Warehouse	200	200	\$ 200	40,000	40,000
7	Zone Warehouse	75	525	\$ 200	15,000	105,000

I. Totals 1., 2. & 3.: 493,500
 II. Plus 20% Distance Factor: 98,700
 III. Total Building Construction: 592,200

F. Recommendations

The choice of contracting method will depend upon the outcome of the negotiations with ECBM for a range of support services. As building construction is only one of the services to be included, it would be difficult at this point to treat it separately from the overall package sought, since no detailed information has been received. This method might not be feasible if the resolution of a global contract is too time consuming, thus delaying construction as well as being too expensive due to contractor overhead. If, to the contrary, the cost for building construction in the global contract remains reasonable and the time for execution acceptable, this option would be the recommended method to follow. If, however, the cost is unreasonably high and the contracting process too slow and burdensome, the alternative of using a local contractor would be a less costly and perhaps a more efficient and appropriate contracting method.

7.2.2 Analysis of Track Improvement

Justification

The GRM has three administrative classifications for its road system: routes of national interest (RN), routes of regional interest (RR) and routes of local interest (RL). As shown on Figure 1, none of the roads, or rather tracks which run into or traverse the project area have warranted any of these administrative classifications. This is but one indication of the isolation of the project area from the national transportation network.

The GRM also categorizes road and tracks based on their physical characteristics as follows:

Class A - Paved roads,

Class B₁ - Improved gravel road with adequate geometrical norms and subbase. Drainage structures do not impede vehicle speed,

Class B₂ - Graveled road for all season travel with some geometrical norms. Roadway in selected materials. Paved fords, and submersible and single lane bridges,

Class C - Improved track with traffic limitations during the rainy season. Minimal geometric norms. Longitudinal profile follows natural level of soil. Surface of natural soil or selected materials. Transversal drainage limited to culverts and fords.

Class D - Dry season track. One lane on the natural soil surface. Few drainage works. Surface of natural soil compacted by vehicles. Passable by trucks and four-wheel drive vehicles.

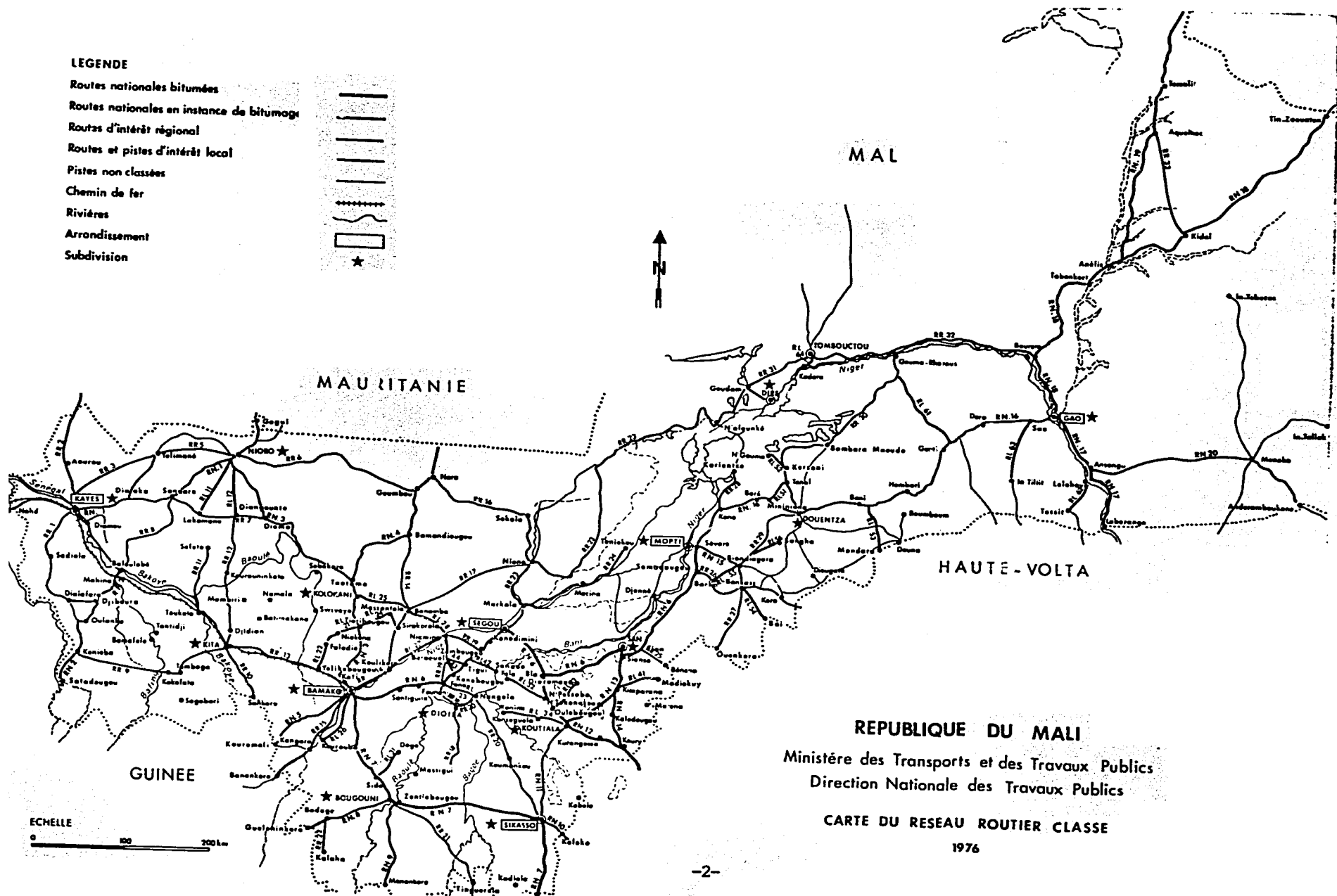
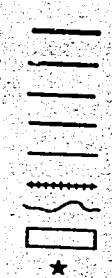
Of the three major access routes which lead into the project area, only one, the newly constructed road to the dam site, rates as high as a Class B. The others are Class C and D. Within the project area itself, none of the routes are better than Class D tracks, and many are worse.

This being said, the problem of access takes on formidable dimensions. The first requirement is to provide adequate, if rudimentary, access into and out of the several zones of the project area by improving links with the national and regional route networks. The second is to establish easy access to new village sites to facilitate delivery and construction as well as to link these new villages into existing, traditional commercial routes. The third is to ensure continued access until flooding to old village sites for the purposes of ready communication and evacuation. The following discussion proposes improvements to several existing tracks in the project area in order to fulfill these requirements. The tracks chosen for improvement are shown on the map on page 4.

The two traditional access routes into the area are from Kita at the east and from Mahina at the northwest. From Kita, on regional route RR 13 and the Dakar-Bamako rail line, a gravel road crosses the Bakoye River on a submersible bridge, then an unimproved, seasonal track leads first north, then westward to Konkoukoutou and Tondidji and continues along the right bank of

LEGENDE

- Routes nationales bitumées
- Routes nationales en instance de bitumage
- Routes d'intérêt régional
- Routes et pistes d'intérêt local
- Pistes non classées
- Chemin de fer
- Rivières
- Arrondissement
- Subdivision



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 Ministère des Transports et des Travaux Publics
 Direction Nationale des Travaux Publics
CARTE DU RESEAU ROUTIER CLASSE
 1976

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the Bafing River northward through Kenieba, Keniekenieko, Manantali, Bingassi and on. From Mahina, on national route RN 2, and also on the rail line, a deteriorating gravel road runs south to Koulougundi, where a seasonal track turns eastward through Soubala and along the left bank of the Bafing River through Madina Goungou, Nantela, Bamafele and south. However, to facilitate access to the dam site, a new, high standard gravel road has just been constructed on the right bank from Mahina southeastwards, directly to Bingassi and Manantali. This is now the major access route from the northwest. Unfortunately, it does not improve the principal vehicular access into the area from the east, i.e., from Kita or Bamako.

To reach the area from Bamako requires passing through Kita and on to the unimproved seasonal track to Tondidji and then up the river valley to Kenieba and Manantali, as described previously. Since this will be the major access route for the project and to the eastern side of the reservoir once it fills, most deteriorated section of this route will require improvements. Tondidji itself will be resettled slightly eastward from its present location and the track onward along the river bank to Kenieba and Soukoutali will be flooded by the reservoir (some flooding will in fact take place during the rainy season in 1986). Therefore, improvements will be made to the access route from the east, the following segment:

"A" Konkoukoutou	25 km
(Village spurs - 300m/village)	600 m)

Improvements to this route are not only required to facilitate project activities, but also ensure eastward access to villages whose westward routes will be cut by the reservoir. Shorter-term repairs and maintenance will be made on the riverine track, the following segment:

"B" Tondidji-Soukoutali	19 km
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These repairs are readily justified by the importance of this link to project mobilization and continuous access.

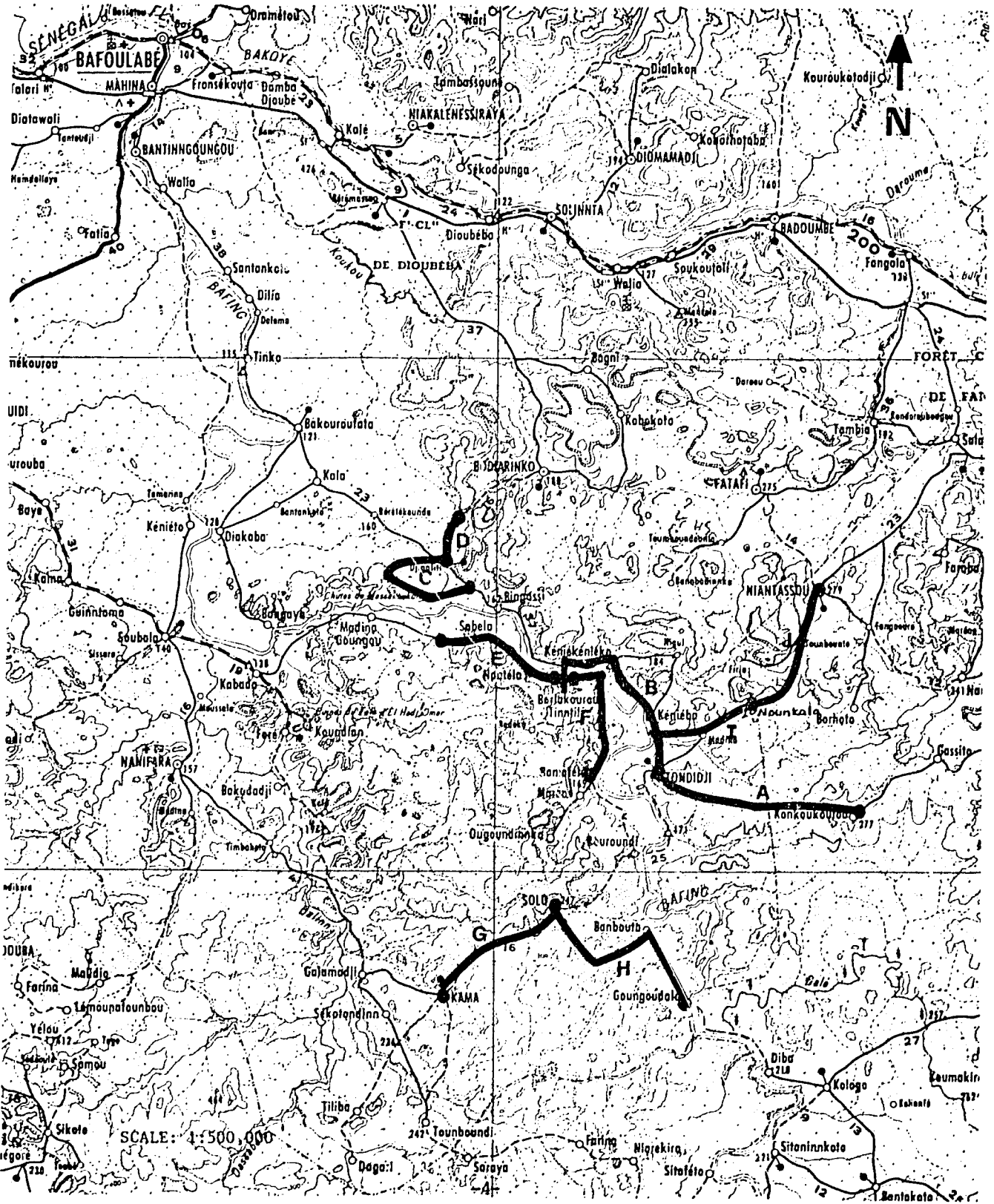
The major new resettlement zones I and II are on both banks downstream from the dam (Bingassi-Faradala and Sobela-Nantela). They are close to the major access routes from the north and east. The establishment of several short new tracks and upgrading of several others will provide adequate access both for the purposes of project work and for the villagers afterwards. The segments necessary are as follows:

"C" Bingassi-Faradala Loop	35 km
"D" Faradala-North	3 km
"E" Bridge-Nantela-West	14 km
(Village spurs - 300m/village)	6900 m)

This work is readily justified by the clusters of twenty-three villages-cum-construction sites in these areas, and the consequent need for both project and commercial access.

Access to the other project zones is more problematical. Only two villages will be resettled in the south near Bambouta and Goungoudala. Access is provided westward by a small seasonal track which leads circuitously to Solo

RECOMMENDED TRACK IMPROVEMENTS/CONSTRUCTION
 AMELIORATION/CONSTRUCTION DES PISTES



and on to Kama and on towards the major access route from northwest, the gravel road from Mahina. Ensuring this access would entail improving the entire existing track, or the following segments:

"G" Kama-Solo	18 km
"H" Solo-Bambouta-Goungoudala (Village spurs - 300m/village)	34 km 600 m)

However, to facilitate the resettlement activities (project management will be located and construction will begin in the northern zones, I and II, discussed above) a north-south access way must likewise be ensured. This can be accomplished along the existing north-south track through Bamafele which runs along the left bank of the river. This segment is:

"F" Bridge-Bamafele	20 km
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This track is poorly drained on alluvial soils; it would require repair and maintenance after each rainy season. This investment should be minimal since the track will be lost by the filling of the reservoir. It will probably also be cut by flooding during each rainy season from 1986 onward.

A second option is to upgrade a small north-south track/trail which runs on a plateau from Nantela through Badeka and Toumania to Sandiguila, south of Solo. This would, however, be more costly due to the two steep rock grades leading to the plateau and to the length of track to upgrade. It would have the distinct advantage of serving as a continuous north-south access route in the future (several hamlets and villager-motivated improvements on this track/trail bode well for continued maintenance). The road design study should explore the relative feasibility and costs of this possibility.

The remaining zone IV on the right bank consists of the new villages to be established between Nounkala and Tombouto. During construction, access will be possible along the right bank track from Manantali through Kenieba, or segment "A" discussed previously. However, future commercial access to this area would be from the northeast via Niantasso. Therefore, continued access must be ensured along the track running past these new village sites northwards to Niantasso. First, temporary repairs to the access track:

"I" Kenieba -Nounkala	14 km
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Then, improvement of the segment:

"J" Nounkala-Niantasso (Village spurs - 300m/village)	15 km 900 m)
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It had been hoped that the improvements to the access ways necessary for the resettlement activities could be coordinated, or better the costs shared, with a separate deforestation operation which is planned for clearing the reservoir area of wood. Unfortunately, this operation is as yet at the feasibility stage, and being studied by a German consulting engineering firm. The deforestation operation will undoubtedly include some work on accessways in and out of the river valley in order to transport the cut logs. However, until such time as a definitive deforestation plan is developed, the project is obliged to make the necessary budgetary provisions to ensure its own access ways. The project will work with the Ministry of Water and Forests to

coordinate activities and to avoid duplication and economize as possible on the amount of improvement work to be undertaken by each project.

Terrain

The climate of the project area is known as "Sudano-Guinean," and could be considered sub-humid. The area has a relatively short but variable rainy season from mid-June to mid-October which is followed by a long dry season. The annual rainfall varies widely between 800 mm and 1200 mm. The natural vegetation varies from herbaceous to wood savanna with occasional, thin gallery forests along water courses. (Average density: 75 trees/ha.) The project area is for the most part a vast series of colluvial peneplains and slopes cut by the alluvial valley of the Bafing River and those of associated small tributaries, and dominated by large buttes, ridges and other outcroppings of sandstone. Erosion is active, and the drainage system pronounced.

Two distinct types of terrain can be differentiated. Low colluvial peneplains abutting steep sandstone buttes and ridges are typical around Tondidji, Manantali and Nantela. Colluvial, transitional slopes at the foot of desiccated, ferruginous plateaus are found around Konkoukoutou and Baobouta. The recent TAMS survey distinguished three major soil types in the project area:

1. deep, moderately fine-textured ferruginous soils, yellowish red in color in well-drained plains and valley bottoms;
2. gravelly, erosional colluvium on plateaus and slopes underlain with an indurated lateritic (petroferric) layer; and
3. stoney, gravelly, shallow colluvium of sands and skree on slopes associated with sandstone buttes and ridges.

The following discusses the physical properties of three soil associations in the project area which would be useful for the improvement of tracks.

Loamy Sands:

This soil is widespread in the project area. It is found in the peneplains where drainage is not well defined. These soils are often laterized and to differing degrees, and can be grouped accordingly.

The dominant form of loamy sand has a granulometry concentrated in fine sands (0.05-0.2 mm) with effusions in the silt and the medium and coarse sand fractions. The large fraction between 0.5-2 mm appears most often composed of lateritic concretions. The coefficient of uniformity is high, between 3 and 5. The effective diameter is about 0.06 mm. The plastic index is relatively low, at less than 10 and the CBR shows a reduced supporting capacity under saturated conditions. This material has a granulometry comparable to the AASHO norm "F" (when the larger fraction is well developed). This soil usually forms a hard surface crust after evaporation, due to the contraction of the grains under the effect of surface tensions; this poorly supported crust crumbles under traffic and the roadway becomes dotted with pulverized potholes. Only a severe compaction of the underlying layers can support his natural surface densification.

These silty sands are strongly isotromorphic. The larger lateritic fraction is sometimes sufficiently developed to be classed as a gravel. The granulometric distribution can correspond to the norms "C", "D" or "E" of the AASHO; the coefficient of uniformity is high. The CBR attains a maximum value for the silty-gravelly soil types. The horizon of lateritic concretion responsible for this classification is usually located at 20-60 cm depth and is of limited thickness. (See lateritic soils below.)

These sandy soils can be used for roadway bases and subbases. Those silty materials with some gravels should be employed with caution on surface layers of the roadway due to its sensitivity to saturation; adequate drainage should be assured for the most strongly capillary materials. Side slopes for the sandy soils should have gradients of 4:1 to avoid sheet and rill erosion. For more gravelly soils the slopes can be increased to 3:1. Gravels and the coarser silty sands could be used on the roadway surface, although traffic and rain can cause erosion of the surface. Very silty materials should be protected by a thin layer of coarser gravel to stabilize the roadway surface. The silty-gravelly soils only require a base of 15 cm at well-drained sites. This base can be thickened to 30 cm in sites with well-drained silty sands. The effects of distension in the most poorly graded sands can be reduced by using a base of 10 cm of graded borrow between a subbase of 15 cm and the roadway surface layer at well-drained sites.

Plastic Soils:

Drainage basins and some outcroppings yield fine-grained, silty-clayed soils. Although formed by different mechanisms, these soils have similar engineering characteristics. These deposits are not widespread and can be considered of secondary importance.

In rocky terrain these soils may be deposited in colluvial deposits which have a high percentage of fines. These sandy clays are plastic and have a low bearing strength when saturated. The compressibility and elasticity characteristic of these materials are normally tolerable for earthen roads.

The drainage basins and major stream beds are sites where the fine fractions of alluviums and colluviums accumulate. These silty soils are normally less plastic than the sandy clays described above, and have a higher bearing strength.

The silty-clayey sands have a granulometry which sometimes approaches the "F" of the AASHO. A subbase of 30 cm is suitable where adequate drainage is assured. The more plastic soils should be protected by a supplemental base of 10 cm of granular borrow on the roadway surface. Compaction at a moisture content less than optimal is recommended to avoid contraction and fissuring. The side slopes of the silty soils should be cut at 4:1 to avoid rilling; these slopes could be reduced to 3:1 for more plastic silty materials.

Lateritic Soils:

Laterites are natural materials which have been much discussed and debated. Having the appearance of a type of rock, the formation of laterites depends on the climate and has little relationship to underlying parent rock. Laterites are a vacular material often variegated, with a yellow to red, and sometimes black tint. They are usually found in a layer containing isolated

concretions, sometimes mixed with a clay portion. This horizon can be indurated in a continuous crust of variable thickness and hardness. These materials are characterized by a low ratio of silicates to iron and aluminum sesquioxides ($\text{SiO}_2/\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$ 2). The yellow laterites are rich in aluminum and have the property of hardening when exposed to air.

Laterites appear to be formed by leaching of the upper soil layers in tropical climates. In zones such as the Sahel, evaporative leaching of lower layers of soil in the dry season is important to the laterization process; it forms the well-defined, aluminum and hematite-rich horizon.

Lateritic soils are normally localized on the plateaus, with outcroppings at mid-slope; they are rarely found in depressions. Lateritic formation can be altered by erosion and lateritic materials can be found in podzolic matrixs, in situ, with properties different from lateritic soils.

The granulometry of laterites is highly variable, but is generally characterized by an absence of sands in the fraction 0.5-2.0 mm. This is caused by the leaching of silicon. The form of the particles is variable, although generally bound in a spherical manner. Their vacular structure often results in exceptionally high permeability. The plastic index is also relatively high.

Unscreened laterites can be used as a granular borrow. The granulometric norms generally recommended for lateritic gravels in semi-arid zones is illustrated by the chart on page 13. The index of plasticity suggested for this norm varies between 25 to 35. The indurated lateritic crusts (ironstone or "cuirasse") can after crushing be used as a base material. The softer crusts disaggregate upon extraction and compaction and make good roadway surfaces.

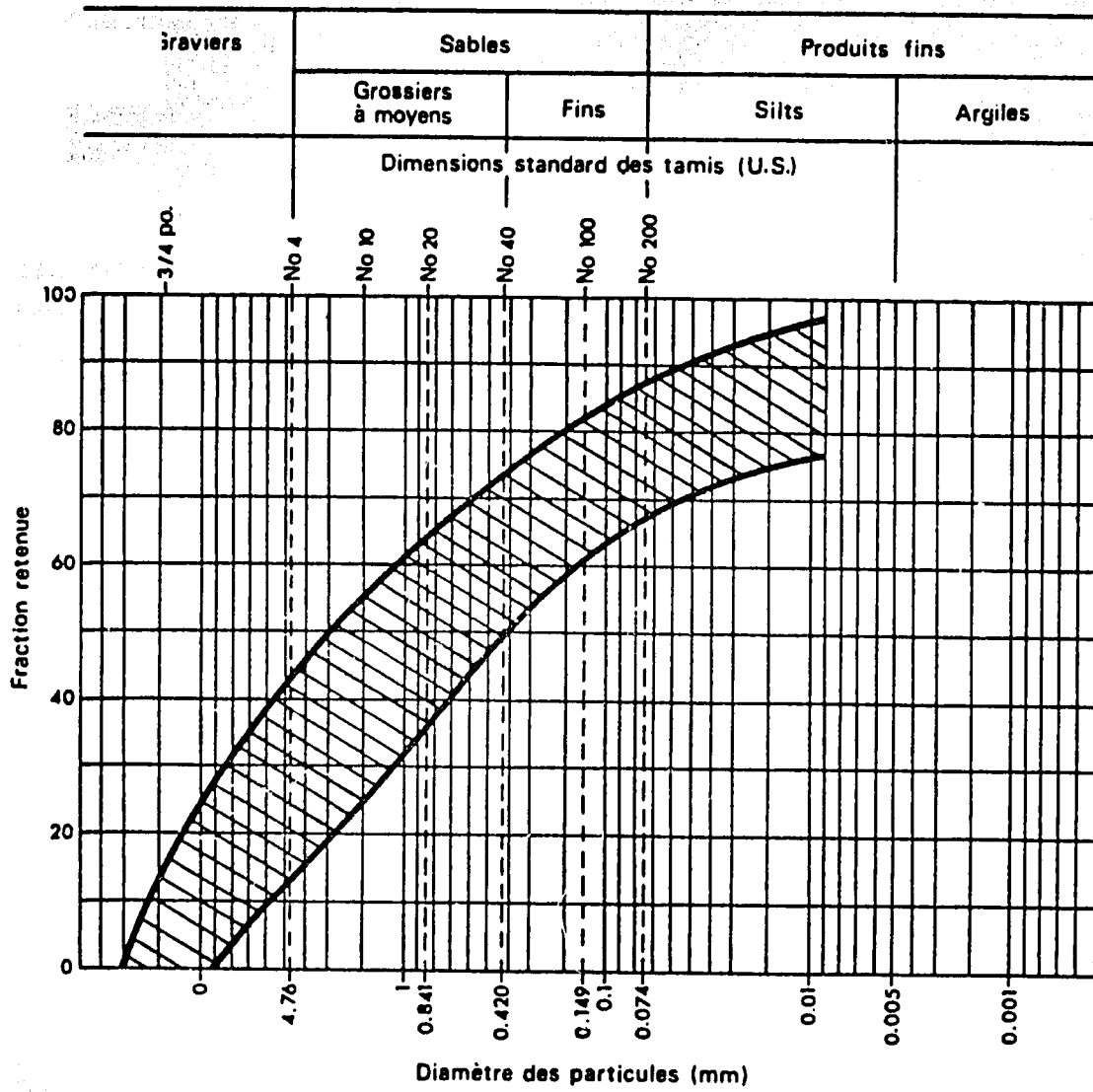
The foregoing discussion has shown that, with proper design precautions based upon the particular soil type and roadway siting, select soils in the project area have sufficient stability for the track improvements planned.

Criteria

The magnitude of improvements to the tracks in the project zone is strictly limited. The rocky terrain and erosive environment, the small populations and markets served, and the lack of any assurance of post-project maintenance strictly proscribe the level of investment, and the design of improvements to the tracks. Improvements will be made primarily to enable ready access to old and new village sites and facilitate the large number of critical transport and construction activities required for successful resettlement of thirty villages within three years. Secondly, to the extent that time and financial resources allow, the improvements will provide continued access to and from the new villages and will also replace those seasonal tracks which formerly served the area, and will be flooded by the reservoir.

The major problems of all dirt roadways in the Sahel are provoked by the extreme differences of the two seasons: a period of torrential rains of relatively short duration, and a longer season of extreme dryness. During the rainy season, normal traffic in the project zone, as throughout similar Sahelian areas, is interrupted. The soils, composed of fine grains, are highly saturated and totally lose their dry state carrying capacity. Of

**GRANULOMETRIC CURVE
FOR LATERITIC GRAVELS**



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course, this phenomenon is not unique to this region. However, the long dry season which follows the rains then dessicates these soils and any remaining cohesion disappears; the roadway surface then degrades rapidly.

To assure normal passage in the rainy season, a roadway must be sufficiently stabilized to conserve its carrying capacity in saturated conditions. This capacity would be easy to obtain by structuring a foundation or subbase of granular borrow material with the drainage characteristics desired. In the light of the irregular distribution of such materials in the project zone, this approach would prove expensive, exceeding the strict budgetary limitations of the project, as well as any reasonable costs per capita of the small population served. An adequate platform or base is, however, essential to the viability and utility of most of the access ways which are necessary for the numerous, logistically-demanding project activities.

Faced with these limitations, it appears that the optimal solution favors first, a judicious alignment of the track to minimize saturation and, second, the utilization of relatively larger amounts of the best drained soils found in place (rather than relying on imported, selected materials). The alignment of the tracks if for the most part fixed, although some modification is possible in certain areas. Improved capillary behavior can be obtained by constructing a fill whose height is determined as a function of the soil type and hydraulic characteristics of the area crossed. Live loading the relatively weak, saturated soils can be avoided by limiting traffic in periods of heavy rainfall. Of course, all fills must still be adequately compacted to minimize structural deformation of the surface. Vehicle numbers and speeds will continue to be extremely low (less than 10 ADT and 20 mph respectively) in the project area. Therefore, to improve drainage and runoff and to economize further on surfacing, the improved tracks will be one lane wide.

All the planned earthwork improvements must be scaled to ensure a minimum level of reliable infrastructure under normal conditions; they can not ensure a sure guarantee under the worst conditions possible. This trade-off was the subject of discussion at the 1980 Low-Volume Roads Workshop in Sierra Leone. In fact, this solution follows closely that described in the AID/W paper on "staged" roadway construction.

Drainage structures represent a considerable investment. For the purposes of this project, they should be designed and constructed as simply and cheaply as possible, with the primary objective of preventing the risk of impassable ruptures in the access ways. These structures will have to be constructed primarily of available materials, simple, yet massively to ensure stability, avoid erosion, and facilitate repair. Due to very low traffic densities, the design of transversal drainage structures can require reductions in traffic speed without causing functional difficulties. A similar design concept is discussed in detail in the Transportation Research Board's Compendiums on Drainage and Low-Cost Crossings. As such, it is impossible to provide generalized structural designs; each drainage way and water crossing is unique requiring site study and individual solutions.

To sum up the preceding, the design parameters for the track improvements are:

- o A suitable, single-lane road bed passable by heavy loads and at low speeds, during the dry periods throughout the 4-year operational life of the project.

o An alignment which conforms closely to existing terrain, ensures the freely drained soils and geometry and avoids rock outcrops, water courses and saturated zones where possible.

o Simple, massive ford or spillway structures in unavoidable, critical zones, which can withstand heavy flash flooding and are repairable with locally prevalent materials.

These parameters lead to the typical designs for track sections and structures shown on the following pages. Quantity estimates will be based upon these typical designs although it should be noted that most of the work planned involves simple repair and improvement, rather than reconstruction.

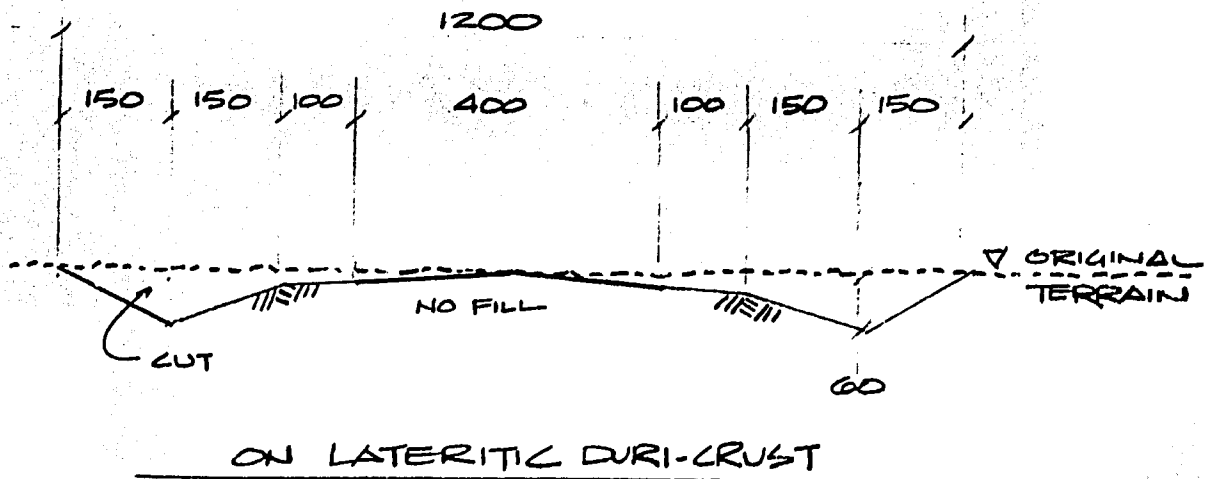
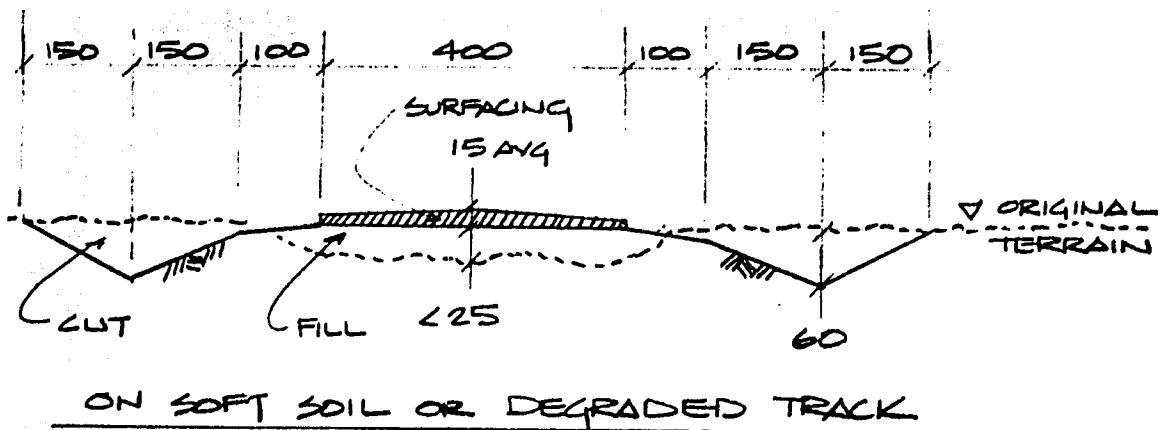
Costs

The following table of itemized, unit costs will enable an estimation of the total construction costs for improvement of each track segment. The basic unit costs shown represent an average maximum of unit costs taken from 1) a compilation of unit costs in recent road contracts prepared by the National Directorate of Public Works in 1982; 2) estimations furnished by a private Malian construction contractor, SNIP (who has just completed work at Manantali); and 3) unit costs charged by the rural works parastatal, O.T.E.R. These unit costs have also been cross checked with those of recent contracts in Senegal and with recent estimations for the Kayes-Nioro Road prepared by a USAID consulting engineer. All costs have been updated to 1983. The kilometer costs are correlated to the repairs required and calculated from the typical road sections and drainageway designs shown on the preceding pages.

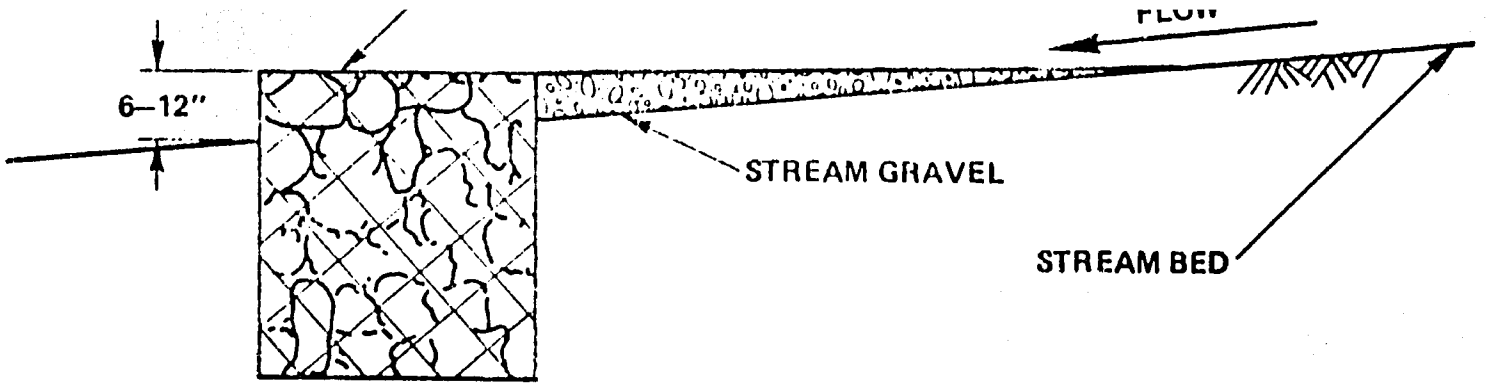
Unit Costs for Track Improvements

<u>Earthwork</u>	<u>Unit</u>	<u>Unit Cost</u> MF	<u>Unit/km</u>	<u>Cost/km</u> 1,000 MF
o Clearing, stripping and compacting subbase	m ²	300	12,000	3,600
o Excavating longitudinal drainage ditches (depth = 60 cm; see sections)	m ¹	1,100	2,000	2,200
o Placing and compacting fill (25 cm thick layers)	m ³	3,100	1,125	3,488
o Transporting surface materials (dist _ 1 km)	m ³ -km	500	600	300
o Lateral drainage ditches	m ¹	1,100	50	55
o Cuts in rock (avg. 1 1/2 m ³ /m ¹)	m ³	12,000	3,000	36,000
o Placing and compacting surface materials (thickness = 15 cm)	m ³	3,100	600	1,860

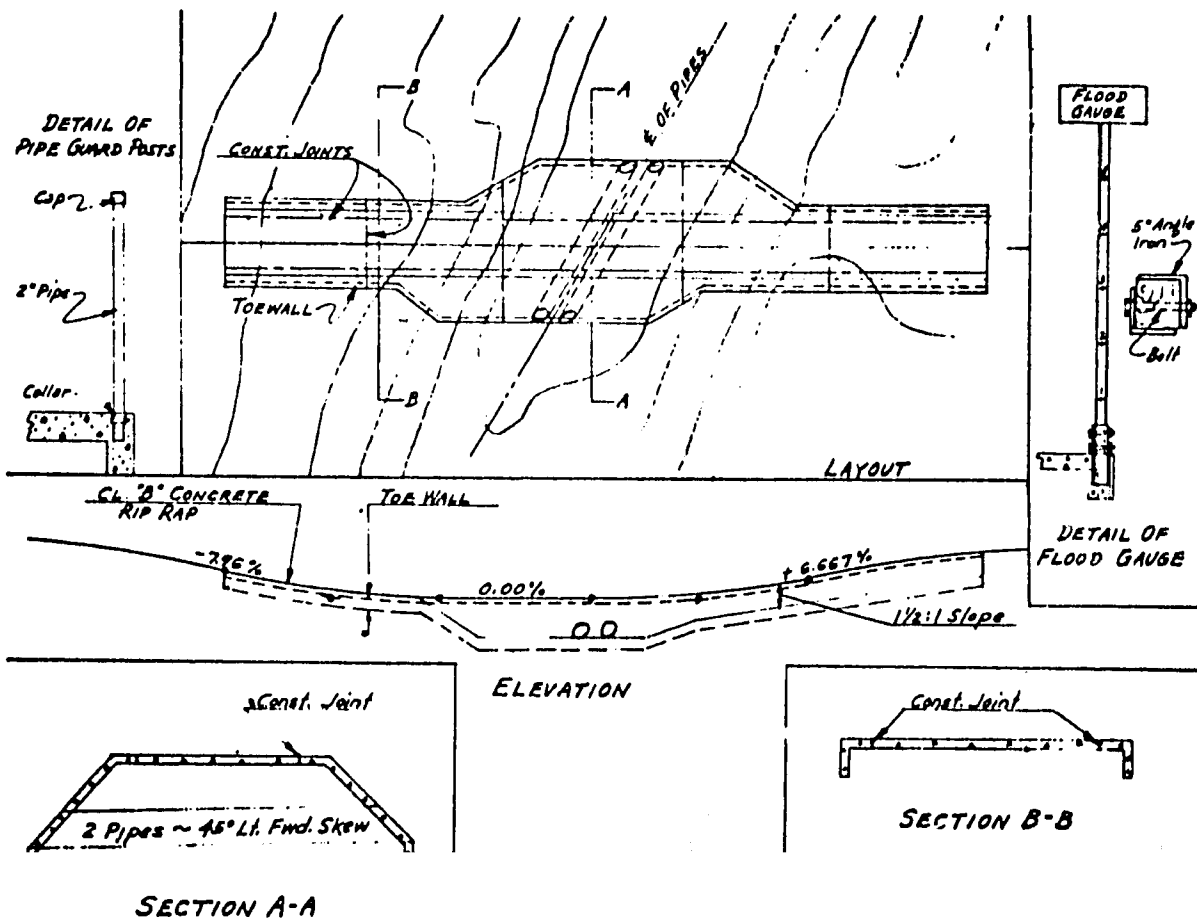
TYPICAL IMPROVED TRACKS SECTIONS.



ROCK FILLED GABION
 3'-3" x 3' - 3" x 6' - 6"



TYPICAL GABION-FORD



TYPICAL CULVERT SPILLWAY

126'

Table continued ...

<u>Drainage Structures:</u>	<u>Unit</u>	<u>Cost/Unit</u> <u>1,000 MF</u>
°Small culverts (300 mm pipes in roadbed)	ea.	20
°Culvert/spillways (500 mm pipe with rock masonry facing)	ea.	500
°Small rock masonry/rubble fords (avg. length = 3m)	ea.	1,500
°Long concrete fords on bedrock/ foundations (avg. length = 5m)	ea.	2,500

These unit costs for various earthworking operations and drainage structures enable each segment of track to be broken down into components of work. The total costs of particular improvements required can then be estimated, adding standard Malian charges for distance and engineering.

The analysis of the physical condition of each segment and improvements necessary is based on sets of 1:50,000 topographical maps and 1:20,000 aerial photos, field notes from the USAID's engineering staff, a site visit and an aerial survey in which each segment was overflown at an altitude of approximately 335 m.

The following is a brief description of the condition of the track segments with an estimation of the costs necessary to improve or repair them:

Segment 'A': Tondidji-Konkoukoutou, 25 km. This partially improved track crosses a well-drained highland into a drainage area. Tow thalwegs require fords and some fill to improve drainage. Lateritic gravel on track. No problems are expected. The quantities of work and costs to improve this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal</u> <u>(1000MF)</u>
Subbase Prep.	3	3,600	10,800
Long Ditching	20	2,200	44,000
Fill	5	3,488	17,440
Surfacing	8	1,860	14,880
Transport	3	300	900
Lat. Ditches	20	55	1,100
Culv. Spillways	4	500	2,000
Sm. Fords	1	1,500	1,500
Lg. Fords	1	2,500	2,500
Contingency @ 10%	1		9,512
Distance Factor @ 20%			19,024
Control @ 2%			2,283
Design @ 250,000 MF/km			6,250
	Segment Total		122,677,000 MF

Segment "B": Tondidji-Kenieba-Soukoutali, 19 km. This deteriorating, heavily used track runs along the right bank river terrace. Very poorly drained. Crosses three major streams and a number of smaller streambeds. A rock area may require treatment. Low-cost, fast and effective repairs will be difficult. Stream areas are expected to be flooded due to dam construction as early as the 1986 rainy season. The quantities of work and costs to repair this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal</u> <u>(1000 MF)</u>
Long. Ditching	15	2,200	33,000
Fill	4	3,488	13,952
Surfacing	3	1,860	5,580
Transport	1	300	300
Lat. Ditching	5	55	275
Culv. Spillway	2	500	1,000
Sm. Ford	2	1,500	3,000
Contingency @ 10%			5,710
Distance @ 10%			12,564
Control @ 2%			1,508
Design @ 100,000 MF/km			<u>1,900</u>
Segment Total			78,789,000 MF

Segment "C": Bingassi-Faradala Loop, 23 km. This new track sweeps around on a slightly rolling, well-drained peneplain. 3-4 drainage areas passed; two marshy areas can be avoided. Rock and lateritic gravels appear available at mid-loop near major outcropping. No major difficulties foreseen. The quantities of work and the costs to establish this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal</u> <u>(1000MF)</u>
Subbase Prep.	23	3,600	82,800
Long. Ditching	18	2,200	39,600
Fill	8	3,488	27,904
Surfacing	23	1,860	42,780
Transport	7	300	2,100
Lat. Ditching	15	55	825
Sm. Culverts	6	20	120
Culv.-Spillway	3	500	1,500
Sm. Fords	2	1,500	3,000
Contingency @ 10%			20,063
Distance @ 20%			44,139
Control @ 2%			5,297
Design @ 600,000 MF/km			<u>13,800</u>
Segment Total			283,928,000 MF

Segment "D": Faradala-North, 3 km. This track passes around and alongside a low colluvial slope which leads up to a steep, rocky butte-shaped ridge. Resurfacing is required and some drainage work, especially two thalwegs running from the ridge. No major difficulties. The quantities of work and costs to improve this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	1	3,600	3,600
Long. Ditching	3	2,200	6,600
Fill	1	3,488	3,488
Surfacing	1	1,860	1,860
Lat. Ditching	3	55	165
Sm. Culverts	2	20	40
Culv.-Spillway	2	500	1,000
Sm. Fords	1	1,500	1,500
Contingency @ 10%			1,825
Distance @ 20%			4,016
Control @ 2%			482
Design @ 400,000 MF/km			1,200
Segment Total			25,776,000 MF

Segment "E": Bridge-Nantela-West, 14 km. This well used track follows the left-bank river terrace, generally on loose soils and crosses a number of streambeds (one, major) and areas of hydromorphic soils. Considerable fill, resurfacing, several drainage structures and a ford will be required. Improvements to this segment warrant close study. The quantities and costs of work estimated to upgrade this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	2	3,600	7,200
Long. Ditching	12	2,200	26,400
Fill	8	3,488	27,904
Surfacing	10	1,860	18,600
Transport	2	300	600
Lat. Ditching	10	55	550
Sm. Culverts	8	20	160
Culv.-Spillways	4	500	2,000
Sm. Fords	1	1,500	1,500
Lg. Fords	1	2,500	2,500
Contingency @ 10%			8,741
Distance Factor @ 20%			19,231
Control @ 2%			2,308
Design @ 250,000 MF/km			3,500
Segment Total			121,194,000 MF

Segment "F": Bridge-Bamafele, 20 km. This deteriorating track follows the left bank southwards mostly on poorly drained, loose river terrace alluvium. Crosses numerous drainage zones and four large streams. Endangered by river bank deterioration. A careful survey required before investing in too many repairs. The quantities

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal</u> <u>(1000MF)</u>
Long. Ditching	20	2,200	44,000
Fill	3	3,488	10,464
Surfacing	10	1,860	18,600
Lat. Ditching	10	55	550
Sm. Fords	2	1,500	3,000
Contingency @ 10%			7,661
Distance @ 20%			16,855
Control @ 2%			2,023
Design @ 100,000 MF/km			<u>2,800</u>

Segment Total 105,953,000 MF

Segment "G": Solo-Kama, 18 km. This small track runs along the foot of a plateau before turning southward into a small drainage basin. Partially surfaced with laterite. Crosses several rocky areas which must be treated. Some fill, ditches and culverts should handle minor drainage problems. No major difficulties expected. The quantities and costs of the work needed for this segment are:

<u>Work</u>	<u>Km</u>	<u>1000 MF/Km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	1	3,600	3,600
Long. Ditching	15	2,200	33,000
Fill	2	3,488	6,976
Surfacing	3	1,860	5,580
Transport	1	300	300
Lat. Ditches	9	55	495
Culv. Spillways	10	500	5,000
Sm. Fords	3	1,500	4,500
Contingency @ 10%			5,945
Distance @ 20%			13,079
Control @ 2%			1,570
Design @ 250,000 MF/km			<u>4,500</u>

Segment Total 84,545,000 MF

Segment "H": Solo-Bambouta-Goungoudala, 34 km. This very small track zig-zags circuitously southward crossing well-drained highland and then several and then several drainage areas along the left bank river terraces. Requires at least one small ford and treatment of several streambeds and outcroppings. A closer survey is needed. The quantities and costs of work estimated to improve this segment are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	5	3,600	18,000
Long. Ditching	30	2,200	66,000
Fill	5	3,488	17,440
Surfacing	24	1,860	44,640
Lat. Ditching	10	55	550
Sm. Fords	5	1,500	7,500
Contingency @ 10%			15,413
Distance @ 20%			33,909
Control @ 2%			4,069
Design @ 300,000 MF/km			<u>10,200</u>

Segment Total 217,721,000

Segment "I": Kenieba-Nounkala, 14 km. This small track runs down into a large valley and crosses a tributary to the Bafing, Temporary rubble ford is necessary. Rocky areas may need clearing. Only small repairs for this temporary access are needed due to flooding. The quantities and costs of work estimated to repair this segment are:

<u>Work</u>	<u>Km</u>	<u>1000 MF/km</u>	<u>Subtotal (1000MF)</u>
Long. Ditching	5	2,200	11,000
Fill	3	3,488	10,464
Surfacing	2	1,860	3,720
Lat. Ditching	2	55	110
Sm. Fords	1	1,500	1,500
Contingency @ 10%			2,679
Distance @ 20%			5,894
Control @ 2%			707
Design @ 100,000 MF/km			1,500
Segment Total			37,574,000

Segment "J": Nounkala-Niantasso, 16 km. This well-used track runs northwards between escarpments, skirting rock outcroppings. One large stream requires fording and several rocky areas need treatment. No difficulties are foreseen. The quantities and costs of work estimated to improve this segment are:

<u>Work</u>	<u>Km</u>	<u>1000 MF/km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	2	3,600	7,200
Long. Ditching	12	2,200	26,400
Fill	3	3,488	10,464
Surfacing	5	1,860	9,300
Transport	2	300	600
Lat. Ditching	6	55	330
Rock Cuts	1	36,000	36,000
Sm. Culverts	5	20	100
Culv.-Spillways	2	500	1,000
Sm. Fords	3	1,500	4,500
Contingency @ 10%			9,589
Distance @ 20%			21,096
Control @ 2%			2,532
Design @ 250,000 MF/km			4,000
Segment Total			133,112,000

Village spurs: An average of 300 m per village, 9 km total. These short tracks are little more than driveways running into and linking the new villages closely with the adjacent tracks. The quantities and costs of work necessary to build these spurs are:

<u>Work</u>	<u>Km</u>	<u>1000MF/km</u>	<u>Subtotal (1000MF)</u>
Subbase Prep.	9	3,600	32,400
Long. Ditching	9	2,200	19,800
Fill	9	3,488	31,392
Surfacing	9	1,860	16,740
Transport	9	300	2,700
Contingency @ 10%			7,478
Distance @ 20%			16,451
Control @ 2%			1,974
Design @ 600,000 MF/km			5,400
			<hr/>
			186,082,000 MF

Adding up the costs estimated for the work on each segment and spur listed above, and including an estimated contractor's "installation fee" (standard in Mali), yields the total estimated cost of the track improvements necessary:

<u>Segments</u>	<u>Kilometers</u>	<u>Costs</u>
A Konkoukoutou-Tondidji	25 km	122,677,000
B Tondidji-Soukoutali	19	78,759,000
C Bingassi-Faradala	35	283,298,000
D Faradala-North	3	25,776,000
E Bridge-Nantela-West	14	121,194,000
F Bridge-Bamafele	20	105,953,000
G Kama-Solo	18	84,575,000
H Solo-Bambouta-Goungoundala	34	217,721,000
I Tondidji-Nounkala	14	37,574,000
J Nounkala-Niantasso	16	133,112,000
Village Spurs	8	106,082,000
Contractor Installation Fee		80,000
TOTALS	206	1,396,751,000

To this total estimate, a supplement should be added. The resettlement will involve many and varied transport activities, some of which will inevitably take place during the rainy season due to the press of time. Therefore, it is prudent to include a factor for the use of heavy equipment for emergency repairs to tracks as well as stuck vehicles. Considering that the rainy season lasts three months and assuming that a couple of prices of heavy equipment (i.e. a bulldozer, grader, or front-end loader) might well be needed during half that time, the following estimate can be calculated:

$$3 \text{ seasons} \times 1/2 \text{ time} \times 90 \text{ days/season} = 135 \text{ days}$$

$$2 \text{ pcs. equipment} \times 250,000 \text{ MF/day} \times 135 \text{ days} + 20\% \text{ distance factor} = 81,000,000 \text{ MF}$$

Adding this to the segment totals above yields,

SEGMENTS	1,396,751,000 MF	
EMERGENCY WORK	81,000,000 MF	
SUBTOTAL	1,477,751,000 MF	
DOLLAR COST	1,970,335	(\$1 = 750MF)
CONTINGENCY (10% included)		
INFLATION (7% one year)	137,923	
TOTAL DOLLAR COST	2,108,258	

It should here be noted that both USAID and the RPU agree that relocated Goungoundala and Diba at the sites requested by the villagers would probably be an error. First, the sites require a major track segment (H: Solo-Bambounta-Goungoundala, 34 kilometers) to be constructed which will serve only 300 people. This is not cost effective. Second, these two villages have social ties to the right bank and would be better off amalgamating with, for example, Kologo. This would provide the villages with better access to markets via the route to Kita. Third, even an improved track as is being considered would deteriorate quickly. Fourth, the small population and thus small production will not likely attract private merchants or transporters to these remote villages. For these reasons, the short-term consultant will be asked to consider the likelihood of dropping segment H. At the same time, the RPU will reopen site discussions with the people of Goungoundala and Diba to suggest alternative locations.

In relation to segment J (Nounkala-Niantasso, 16 kilometers), the short-term consultant and the GRM Division of Rural Engineering should study the possibility of linking Zone III (Nounkala) with New Tondidji (Tintioulou). This would provide all the villages of Zone III with suitable links to the extension toward Kita.

Construction

This project consists of a large number of time-critical construction and transportation activities. The provision of assured and relatively easy access into the project area must be completed early if the other construction activities are to be completed on time. Therefore, work on track improvements must begin as soon after project authorization as possible.

The first requisite of this work is a detailed field study of each track segment, and consequent preparation of designs and construction specifications. A concurrent field study of each new village site, leading to specifications for clearing each site, clearing the necessary agricultural land and transporting clay for houses would also be appropriate, indeed cost-effective, at this time. (See Village Construction and Land Clearing Annexes). This study could be undertaken by either of two GRM institutions, the Directorate of Public Works or that Rural Engineering, or by a private firm under contract.

The best and most expeditious alternative appears to be the Directorate of Rural Engineering. However, a short-term contract engineer should also be recruited to assist this study and the preparation of bid documents. Contracting a private firm for this study would entail requests for proposals, competitive bidding, and contract preparation, all requiring considerable USAID administrative and technical inputs and, of course, time. This would be an additional burden on the USAID and project management during the critical start-up period and could result in delays in fielding the study team, possibly until the following dry season (and thus possibly

setting back the entire implementation plan). Contracting hassles and time could be avoided by drawing up an agreement directly with a GRM institution and recruiting a short-term engineer through an IQC. Fortunately, both GRM institutions are familiar with the exigencies of track improvements and have the technical ability to produce simple designs and standard construction specifications. Discussions with Public Works indicated that their field teams were committed to other projects and would not be available early next year. Also, Public Works priorities (and limited resources) are directed at national and regional routes or force-account work brigades for agricultural parastatals, neither of which is relevant or appropriate for this project. Nor has Public Works any experience with agricultural land clearing. On the other hand, Rural Engineering is familiar with both the Manantali Dam and Resettlement Projects and apparently has the available technical capacity to start on a detailed field study now. This was re-emphasized by the Chief of the Rural Engineering design office who accompanied the engineering team's site visit and aerial survey. Short-term engineering assistance would help this office produce the best and most timely design and construction documents. Moreover, low-cost drainage structures will be critical to the track improvements; a contract engineer could focus productively on these areas. A scope of work is found on page 32.

It was recommended to the Resettlement Project Director that Rural Engineering be formally requested for a proposal for the field study of track improvements (as well as other project construction activities). Signature of an agreement with them should represent the very first sub-obligation of funds as soon as the project is authorized. The second should be a PIO/T for a hardy, French-speaking engineer familiar with roadway drainage in arid lands.

Once Rural Engineering and the contract engineer complete the field study, design and specifications, the construction documents would first be submitted for USAID approval. The project would then issue a request for proposals from both private contractors such as SNTP, SATOM, etc. and the GRM rural construction parastatal OTER.

Visits and discussions with the directors of both SNTP and OTER confirmed their interest in a construction contract for the work proposed. SNTP, a private Malian-French contractor, recently completed over \$1 million of housing construction at the dam site and also seems to have both the equipment and organization to handle \$800,000 worth of work annually. SNTP's heavy equipment includes 6 large bulldozers (D6/7), 5 graders, 5 scrapers, 10 dump trucks and 5 front-end loaders - a good range of equipment for the job at hand. OTER, a parastatal linked to Rural Engineering, does not have SNTP's familiarity with the area, nor quite this amount of heavy equipment. OTER did, however, perform commendably and inexpensively on \$1 million of AID-financed dike construction in 1979-80. The choice of construction contractor should be based on the quality and cost of their proposals.

A construction plan for the track improvements, and including village site and land clearing is shown on page 34. The plan assumes track improvement and clearings with the following heavy equipment:

- 4 bulldozers (CAT D6/7)
- 3 graders (DAT 14G)
- 5 scrapers (CAT 615)
- 2 front-end loaders (CAT 920)
- 5 dump trucks (10-ton)
- 2 compactors (1 vibrator, 1 sheep's foot)
- 2 cistern trucks (4000-L)
- 1 maintenance van
- associated support vehicles

The resettlement zones with the largest number of villages should receive first priority. However, since project mobilization will depend on repairs to the "entrance" track segments "A" and "B" from Konkoutou, work should begin there immediately and then, the major portion of the team should move on and begin in Project Zone I with track segments "C" and "D" and village sites. Completion of the improved tracks and village sites would probably require 4-5 months, and must cease during the mid-85 rainy season. At the beginning of the following dry season 85-86 work in Zone I should be terminating and work should begin in Zone II with track segment "E" and the village sites. The following dry season 86-87 work should shift to Zone IV, track segment and village sites. Any unfinished work should also be completed on track segment "A" at this time. Work would probably continue in this zone into the next dry season, 87-88, but the major part of the team should move back across the river and south to begin work in Zone III on segments "H", "F" and "G". These villages will be the last to be flooded, so work here can continue through 1988. A separate and smaller land clearing team will follow the work on the tracks by about one season as shown on the construction plan.

SCOPE OF WORK
SHORT-TERM CIVIL ENGINEER

The engineer must have a strong background in rural roads and drainage works and construction contracting, including a BSc in Engineering and several years project experience in another tropical country. Willingness and fitness to work in a very remote, difficult environment with little support and a R-3, S-2 competency in French are also necessary.

The engineer will arrive in Mali no later than May, 1984 and work with the Rural Engineering Project Team in the field and in Bamako for a period of six months. The engineer's specific tasks are:

1. To work with the project team to survey and study each track segments to be improved in order to determine
 - a) the optimal track alignment;
 - b) the quantity of work necessary;
 - c) appropriate solutions to each drainage problem;
 - d) location of suitable fill and surfacing materials; and
 - e) feasibility of coordination with deforestation operations.

These determinations must be within the least-cost parameters of track improvements as described in the Project Paper Annex.

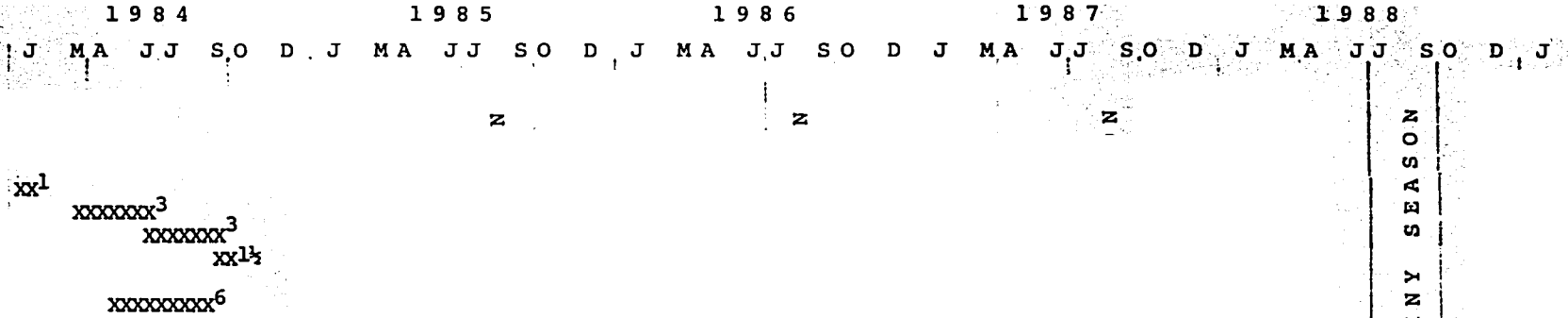
2. To prepare with the project team a complete set of construction bid documents in French including
 - a) specific descriptions of the location and quantity of earthwork including maps, sample sections, lists of quantities, and technical specifications;
 - b) detailed designs, lists of quantities and technical specifications for each drainage structure;
 - c) specifications, including locations and quantities, for village site stripping and agricultural land clearing; and
 - d) itemized cost estimates of all above.
3. To provide limited engineering assistance to USAID and "Service Hydraulique" project management on other technical components of the project as requested.

CONSTRUCTION PLAN: TRACK IMPROVEMENT AND SITE AND LAND CLEARING

DESIGN PHASE

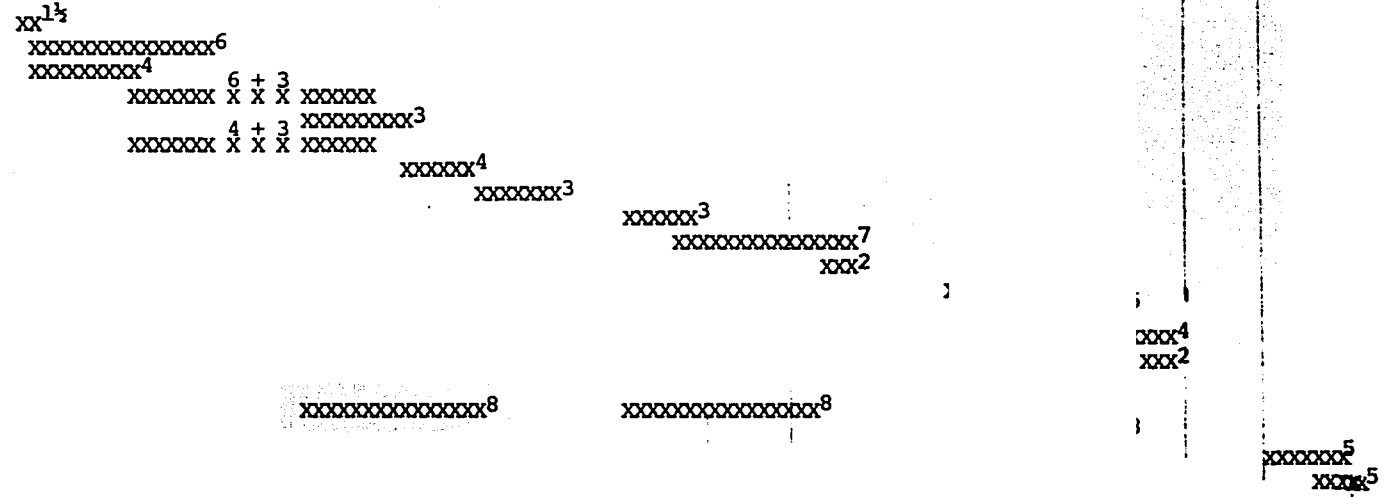
Rural Engineering

- Agreement
- Field Survey
- Prepare Specs.
- Call for Bids
- Contract Select
- Short-Term Engineer



CONSTRUCTION PHASE

- Mobilization
- Improve Seg. A
- Repair Seg. B
- Build Seg. C
- Improve Seg. D
- Clear Sites I
- Improve Seg. E
- Clear Sites II
- Repair Seg. I
- Improve Seg. J
- Clear Sites IV
- Repair Seg. H
- Improve Seg. F
- Improve Seg. G
- Clear Sites III
- Land Clear I
- Land Clear II
- Land Clear III
- Land Clear IV



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7.2.3 ANNEX: LAND CLEARING ANALYSIS

7.2.3.1 Introduction

Land clearing must be accomplished by the project for both village sites and for cropland under constraints of limited time and labor. The most appropriate method of land clearing must take into account factors of time, cost, village participation, and ecological degradation. As over 90% of the land to be cleared will be used for cropping, minimizing soil degradation is of vital importance.

Land clearing is an important step in establishing farmers in new fields -- under unlimited time constraints the ideal land clearing method would be totally in the hands of the farmers themselves. Farmers would likely clear their land with more care and deliberation as to what trees to leave standing, removal of roots and bushes, etc., than would a hired crew. As time and labor are critically limited, different land clearing methods will be considered.

7.2.3.2 Factors Governing Clearing Method

The new villages will be located in upland, wooded savannas with some riverine fringe forests. At some of the new sites, much of the agricultural land has been cleared in years past and now lies in herbaceous fallow or secondary growth. Soils in the project area are predominantly Alfisols and Ultisols whose agricultural capabilities are largely dependent on topography and the presence of lateritic material. Topsoil in much of the area is shallow (less than 50 cm), overlying plinthite; even so, under the traditional system low intensity cultivation of peanuts, fonio, cowpea and bambara nut is possible.

The time required to clear different zones in the project will vary. In some areas, such as Zone IV, an estimated 70% of the land has been cleared before and is in herbaceous fallow. However, at most of the new sites cleared land is scarce. In the area with the largest concentration of new villages, Zones I and II, only 10% of the potential agricultural land appears to have been cleared before. Therefore, using the figures of 6000 total hectares for field crops (see Agricultural Analysis) and the planned repartition by zone, and by adding 500 hectares for new village sites (actual area plus 20% increase for expansion), the area of land requiring clearing by zone is:

Zone I	90% of 3,548 ha.	=	3,193.2 ha.
Zone II	70% of 966 ha.	=	676.2 ha.
Zone III	30% of 221 ha.	=	66.3 ha.
Zone IV	90% of 1,265 ha.	=	1,138 ha.
Village Sites			<u>500 ha.</u>
Total to Clear			5,574.2 ha.

In order to estimate the difficulty of clearing these areas, an assessment of trees was necessary. A recent inventory of the trees in the portion of the river valley to be flooded showed the following distribution of tree types and sizes:

<u>Tree Species</u>	<u>Average Diameter (cm)</u>	<u>Average Number/Hectare</u>
Pterocarpus Erinaceus	24	13
Daniellia Oliveri	33	4
Cordia Pinata	26	4
Aneogesus Leocarpus	37	1
Acacia Specialis	22	1
Kaya Senegalensis (Afr. Mahogany)	71	1
Vitellaria Paradoxa	22	11
Parkia Biglobosa (Locust Bean)	28	1
Bombax Costatum (Kapok)	29	3
Prosopis Africana	30	2
<u>Other Species</u>	<u>13</u>	<u>140</u>
Average:	17	Total: 179*

* Reference:- Salif Kanouté, Rapport sur l'inventaire des forêts de la Retenue du barrage de Manantali. Bamako; Ministère du Développement Rural, 1979.

- Hubert Forster, Inventaire du bois dans le barrage près de Manantali au Mali. Munich, 1979

Discounting the more productive trees which the farmers leave growing in their fields, there is an average of 158 trees/hectare in the savanna within the resettlement zone, including the fringe forests along the river tributaries. It should be approximately representative of the new lands near the upland sites. It should be noted that only 18 of the 158 trees/hectare have average diameters greater than 22 cm. (8-1/2 in.) and that "other species" represents saplings, very small trees, and shrubs with average diameters of only 13 cm (5 in.).

In addition to the existing density of trees and brush to be found in various zones, other factors bear upon the choice of the appropriate method. The traditional practice of not cutting productive trees--those which bear fruit, provide ingredients for medicines, furnish fiber for rope, are used to make household furnishings or kitchen implements--has already been cited. Also, both traditional and modern influences on cultivation practices need to be considered. For example, farmers cultivate mainly with hoes of various sizes--not much animal traction is used--and often plant in orchards or in and around productive trees. Further, fields which have been in fallow and are put back into production are seldom completely cleared. Trunks and stumps may be left intact permanently or until labor permits removal in the future, which may be a growing season or more away.

The project must nonetheless lighten the burden of physical labor required by the resettlement. To diminish competition for soil nutrients and sunlight between trees and cultivated crops, the project should finance the removal of larger species.

Soils must be protected from compaction, erosion, and subsequent physical and chemical degradation. In much of the resettlement areas, removal or disturbance of the thin layer of topsoil would expose the underlying lateritic soils, thus severely reducing crop and pasture production potential. The land clearing must be done with minimal disturbance of the top soil. This is most important for fields to be cultivated but also applies to village housing sites because women grow their gardens on plots within the family concession.

The appropriate clearing method must accommodate participation by village representatives. Members of the Village/Project Coordinating Committees will be asked to identify trees to be removed from housing and field sites.

Finally, as will be discussed below, the management requirements, logistical support, labor demands, time needed, and cost are aspects which weigh upon land clearing method.

7.2.3.3 Alternative Methods Considered

In traditional systems clearing is usually done by hand using indigenous tools such as machetes, axes, and hoes. To ensure regrowth during the next fallowing period, stumping is generally not done. This method of clearing causes the least soil disturbance, and the problem of run-off and soil erosion is generally minimal. However, this system is inappropriate for large-scale land clearing, since it is slow and very labor-intensive.

Land clearing for crops and pastures can also be done manually by "ring barking". This method is generally effective for eradication of trees up to a certain size. Ringed trees, however, take a long time to die, and the shading by standing trees can be detrimental in establishing good crops.

A third alternative would be some combination of selective or clear-cutting--to remove particular trees or to completely denude the site--using heavy equipment such as specially-equipped tractors or bulldozers. Mechanical clearing operations vary depending upon tree density, nature of the dominant species, thickness of the underbrush, soil properties and the cropping system to be used. Some of the procedures used include knocking down the trees with (a) a heavy chain pulled between two tractors, (b) a heavy roller with blades, (c) a front-mounted dozer blade, (d) a combination of tree pusher and root rake, and (e) a flat-bottomed cutting blade that can shear the trees at ground level. Each method has relative merits and demerits, and their use depends to a large extent on the soils and intended land use. The technique that causes the least soil disturbance and leaves leaf litter and other biomass on the soil surface is necessary for soils susceptible to erosion (i.e., kaolinitic Alfisols). The World Bank-financed OAPF project near Bamako is using chains with apparent success in a wooded savanna area.

Compared with mechanized clearing, manual clearing operations are slow and inefficient. Depending on the vegetative cover and tree density, manual operations without stumping and burning may require up to 80 man-days/hectare for complete clearing of woody savanna. Traditional "incomplete" clearing generally requires less than 25 man-days/hectare again without stumping and burning. On the other hand, based on work at IITA, (Copper, Lal and Classen, 1981), it requires about one working hour/hectare to clear with the shear blade attachment compared with two working hours/hectare required with the tree pusher/root rake combination. The fuel consumption is also about 50 percent less for the shear blade than for the tree pusher attachment. More important, soil disturbance is minimal with a bulldozer-mounted shear blade. Tests in 1981 at IITA showed little difference in runoff and erosion rates between mechanized shear blade use and traditional methods if care is taken to avoid excessive traffic over the field and if land is cleared under dry field conditions. Trees can be cut but roots and trunks will remain in the field.

Using chain saws is a fourth possibility. However, this method would be efficient only for cutting and felling larger trees and not appropriate for the smaller brush and shrubs prevalent in the resettlement zone. The large-scale labor requirements are considerable: a skilled saw operator for two days/hectare and dozens of unskilled man-days/hectare for moving the sawn wood. More critically, the management and organization necessary to keep several dozen fragile chainsaws, skilled operators and work crews running is another logistical burden on the project.

7.2.3.4 Method Retained

Given the time and labor requirements of traditional land clearing methods and the logistical setup needed to support a chainsaw operation, the most time and cost-effective method of land clearing, which is also environmentally sound, appears to be the use of bulldozers with shear blades for larger trees and with chains or bladed rollers for smaller trees and shrubs. The valuable tree species to be retained will be clearly marked with paint prior to clearing operations. No large trees will be uprooted and no land leveling or seedbed preparation will be done. Where necessary, due to the density of trees and heavy brush, larger, fallen trunks will be pushed or dragged to the field perimeter. Farmers will be responsible for burning off scrub and for seedbed preparation. They will likewise be charged with the distribution and stockage of felled timber for use as firewood during the subsequent rainy season. The availability of this wood will reduce the physical labor burden on both men and women by eliminating the demanding task of cutting and transporting wood, often over long distances, to stock for rainy season needs.

The land clearing plan and contract will be approved by AID and the RPU prior to execution.

7.2.3.5 Area/Cost Estimates

Fields to clear	5,074.2 hectares
Village sites	500 hectares
Total hectarage	5,574
Equipment time/hectare	1.5 hours
Total hours required	8,361 hours
Equipment days	1,195 (7 hour day)
Daily equipment cost	250,000 MF (\$1/750 MF)
Total equipment fee	\$398,333
Distance Factor (20%)	79,667
Inflation (7% one year)	33,460
Contingency (15%)	76,719
Total	\$588,179

7.2.3.6 Implementation

This activity will be contracted directly by USAID via competitive bidding to a Malian government agency such as OTER (see Tracks Analysis, 7.2.3) or a private company. It should logically be executed by the same agency or company that does the tracks component. The sequence of site

clearing should coincide with the village transfer plan as outlined in Annex 7.1, Evolution of Site Selection Process/Transfer Plan. Thus, all existing villages located at elevations below 170 meters and scheduled to move in May 1986 will have their new sites cleared first.

Monitoring will be done by the personnel of the RPU Division of Technical Monitoring. The on-site wells construction technicians or the field-based CD agents will be continually at the construction sites. They will follow the day-to-day achievements. At the same time, the Village/Project Liaison committee will be asked to have representatives at the new sites on a permanent basis once construction activity begins. All land clearing should be accomplished by April 1987.

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7.2.4.1. INTRODUCTION

This analysis presents the data and methodology used for the design of an appropriate water supply system for villages forced to move by the filling of the reservoir of the Manantali dam.

The hydrogeological background is described in Section 7.2.4.2, and indicates the results of field prospecting done by a team from the Direction Nationale de l'Hydraulique et de l'Energie (DNHE) to determine the water potential at locations provisionally chosen as resettlement sites.

A discussion of alternate water supply systems justification for the primary system chosen in the development of village water points, and a suggested implementation plan are presented in 7.2.4.3.

7.2.4.2 HYDROGEOLOGICAL CHARACTERISTICS OF THE PROJECT AREA

A. Geology of the Manantali Region

The region of Manantali is essentially characterized by a plateau of successive formations of Cambrian sandstones traversed by a system of faults and associated network of fractures. The Bafing River, with its source in Guinea, cuts through the sandstone formations which take on the morphology of escarpements, hills and isolated buttes. The parts of the plateau which are the most elevated in the project area are on the right bank of the Bafing, east near Nounkala (530 meters), and on the left bank, southwest of Barlakoura (454 meters), and southeast and north of Ougoudinko (443 and 430 meters).

The more recent surficial formations are alluvial clays, silts and sands adjacent to the river and secondary streams. Soils become more lateritic toward the areas of higher relief. The sandstones are generally massive to thin bedded, quartzitic with some conglomerate, interbedded with shales, and in part altered by weathering. They are cemented commonly by a more or less calcareous material and in some cases by silica, being highly compacted and hard. The strata are relatively underformed, with microfissures through certain formations. Different systems of faults extend throughout the region, with intrusions of dolerite along some of the fractures.

B. Hydrogeological Characteristics of Resettlement Zones

Detailed knowledge of the local hydrogeological conditions was afforded by the UNDP financed study conducted by the Direction Nationale de l'Hydraulique et de l'Energie (DNHE) and a thorough reconnaissance of the project area by Mission engineers. The resulting data allowed for an accurate interpretation of the subterranean lithology and its corresponding hydraulic characteristics, in the interest of investigating the potential for development of water points in the resettlement zones.

1. Sequence and Description of the Formations

The topsoil is mostly a layer of sandy clays or clayey sands which extend to a depth of 3 to 5 meters. Eroded soils carried by water and deposited from the alluvium, which lie on a layer of lateritic subsoil, eroded and deposited, or formed in place. These soils are unconsolidated and range from coarse to fine in particle size.

The rock substratum is composed of a series of sandstone beds which extend to the limit of the reconnaissance boreholes, the deepest being 100 meters. The sandstones range from quartzitic to feldspathic with traces of heavy minerals and localized beds of jasper. The cementing material is calcareous or siliceous.

The top bed of sandstone reaches an average depth of 10 meters. It tends to be disintegrated and permeability is relatively high due to weathering.

The next deeper bed of sandstone continues to an average depth of 23 meters. alteration and decomposition occur to a lesser degree and usually in areas where the calcareous cement has been dissolved or where fissures have developed. As finer particles fill in the voids of the weathered rock, the layer becomes less permeable.

The next deeper bed of sandstone is more compacted, massive and hard. It extends to an average depth of 43 meters. The formation is impermeable, except in areas traversed by a network of fractures. The fractures and associated fissures can store significant quantities of water.

This bed is underlain by a bed of ferruginous shale, interbedded with jasper. The depth of the shale varies according to the degree of interbedding with the adjacent sandstones, as well as with geographic position and the bank of the river. On the average it reaches to a depth of 65 meters. The shale is very fine grained and impermeable, except where intersected by fractures. As the fractures increase with depth, greater is the amount of water that can be stored.

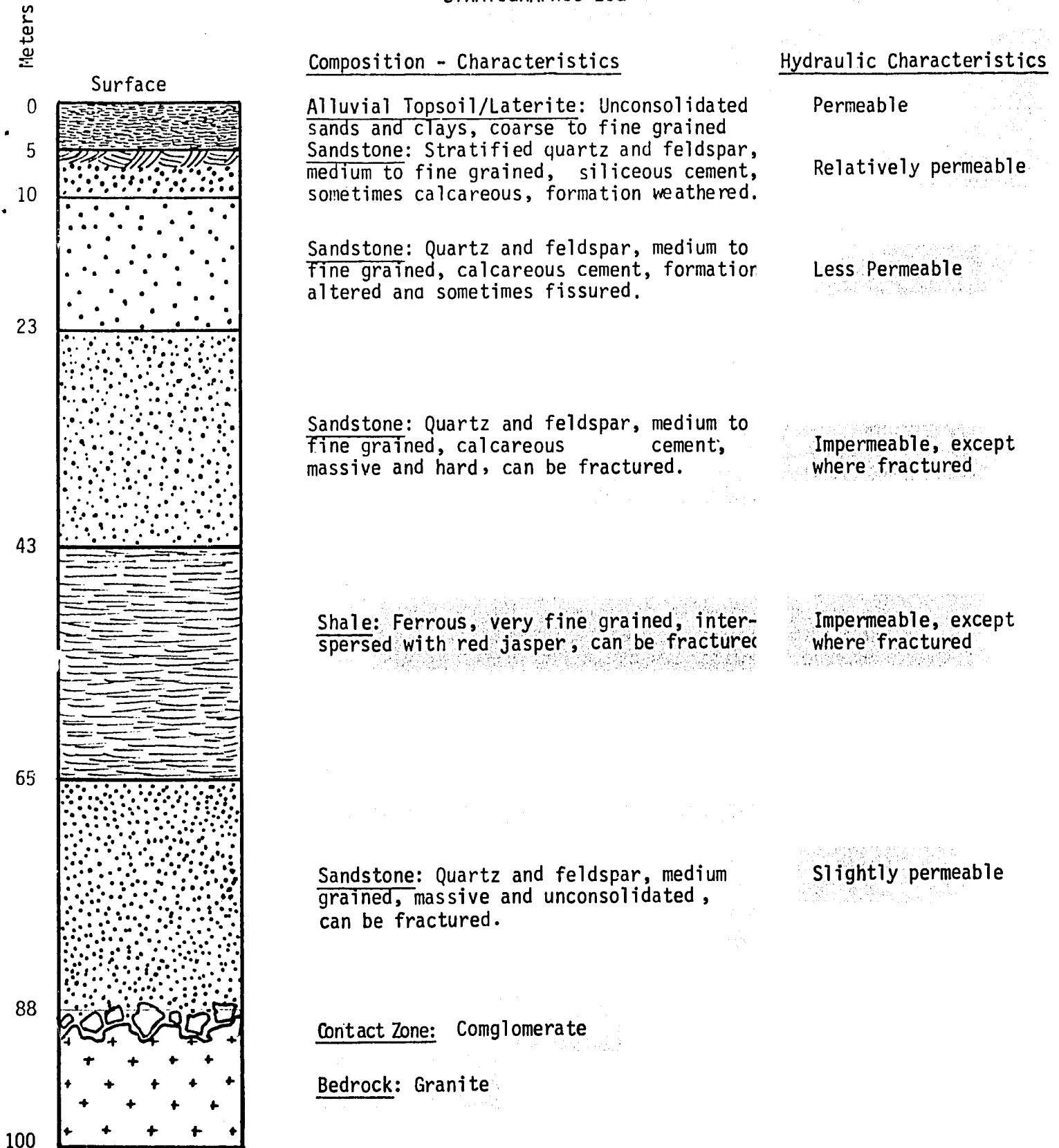
The deepest layer of sandstone continues to an average depth of 88 meters, where it is interrupted by a contact with the underlying granite bedrock. This sandstone bed is massive and unconsolidated. The permeability of the rock itself is slightly increased due to an absence of cementation, but the significant quantities of water are found in fracture zones.

In some areas, intrusions of dolerite have intersected the sedimentary beds, creating zones of contact metamorphism adjacent to the intrusions. Networks of faults and fractures are associated with the upper part of the intrusive masses, producing favorable zones for groundwater storage.

The sequence of geologic formations in the area is illustrated in Figure I.

FIGURE 1

STRATIGRAPHIC LOG



Scale: 1/500

147^x

2. Hydraulic Characteristics of the Formations

The subsurface distribution of water is limited to two zones. The first is the alluvial aquifer, or groundwater of the saturated portion of the topsoil, subsoil and the disintegrated substratum. Its upper limit is defined by the water table, and its lower limit by the impervious substratum. The second deeper aquifer is confined in the substratum. The two aquifers differ markedly in their hydraulic characteristics and potential for exploitation in developing water points.

Upper Aquifer:

The topsoil and subsoil layers are favorable to the accumulation of water due to the permeability of the sandy soils. Permeability is slightly reduced in areas of higher clay content, or where soils are composed of compacted laterite.

The underlying sandstone also contains a certain amount of water due to its weathered nature and resulting porosity. This is reduced increasingly with the next layer of sandstone, as the rock becomes harder and less altered. Only in areas of microfissures does the bed have water-bearing potential.

The combination of these layers, especially the first 10 meters, and to a lesser extent down to 23 meters, have the greatest potential for water storage in the upper aquifer. The availability of groundwater, in these layers, however, is dependent upon the rate of recharge, as water naturally depleted by evaporation, transpiration, and lateral percolation. An annual rainy season of approximately five months provides infiltration to the aquifer directly through downward percolation of rainwater, and indirectly through seepage from rivers and streams. The alluvial aquifer becomes especially productive during this period, as it is constantly replenished.

Subsequently, as the rains cease, the water table drops and productivity is dramatically reduced during the hot and dry season, which continues for the remainder of the year. Year-round storage is limited due to the thinness of the productive groundwater layers. If, however, the soil layer is greater than 15 meters, which is rarely the case, the storage area is greater and there would be enough water to sustain a favorable yield for year-round exploitation by many families (as is the case with the Niger alluvial soils).

Lower Aquifer:

The underlying series of sandstones, themselves, have limited possibilities for water storage, as the rocks become finer, more compacted, and generally impervious. Large quantities of water are present, however, at depth where tectonic activity has caused fracturing through the formations and water has accumulated in the substratum. In the project area these subterranean aquifers are found between 20 and 80 meters of depth, and on the average at 46 meters. Fracture zones resulting from doleritic intrusions can also be productive aquifers in the fringe areas of contact metamorphism.

These aquifers have the best potential for exploitation and furnish the best well yields. These sources can be exhausted over time, however, as the fracture systems are not continuous. Water which has accumulated in fractures and associated fissures, is stored in quantities comparable to the extent of the network, whether it be extensive or only localized.

C. Identification of Water Resources in the Resettlement Zones

The well drilling team from the DNHE executed a series of drilled wells in identified fracture systems in order to provide quantitative data on water resources in each of the predetermined resettlement zones. Location of the drilled test wells was systematically accomplished through the use of a combination of photographic interpretation, geophysical soundings and extensive field reconnaissance. Aerial photographs were used to detect the occurrence of fracture zones by identifying particular land features or lineaments, and geophysical prospection was done in order to localize fracture zones more precisely through the use of resistivity soundings.

More detailed data about the characteristics of the drilled well itself were obtained concurrently with the lithologic and stratigraphic data, during the reconnaissance campaign. Important information was gathered on the depth and rate of penetration, well yield, the depths where significant outputs of water were encountered, the static water level in the borehole, the temperature and the conductivity of the water. Most of these characteristics are specified in Table I.

Twenty six small diameter drilled wells were executed, to an average depth of 68 meters, with the shallowest being 43 meters and the deepest being 100 meters. PVC casing was inserted in the upper portion of the well to prevent caving in of the topsoils and

decomposed substratum. Once solid rock was attained, at an average of 26 meters, the casing was placed and drilling continued at a smaller dimension (from 150 mm to 100 mm).

Fractured zones with measurable outputs of water were mostly encountered between 36 and 52 meters, though some were encountered as shallow as 20 meters, or as deep as 80 meters. The average among all 26 wells was at 46 meters. As fracture systems became more extensive with depth, drilling was often continued until a larger output of water was obtained. Where water was encountered, the output was measured, the yield determined and the static water level measured.

The minimum yield considered exploitable for a drilled well by the DNHE is 1 cubic meter per hour ($1\text{m}^3/\text{hr}$) or 1000 liters per hour, considering 12 hours of pumping per day. On the average, this could furnish a village of 150 inhabitants and their animals with water year-round.

Of the 26 wells executed, six produced negligible quantities of water (less than $1\text{m}^3/\text{hr}$) giving the campaign an overall success rate of 77%. Six wells produced over $5\text{m}^3/\text{hr}$, the most productive being an artesian well measured at $26\text{m}^3/\text{hr}$. The average potential yield of the 26 wells was $3.7\text{m}^3/\text{hr}$.

The static water level was also found to be relatively high, on an average of 8 meters below the ground surface. All resettlement zones gave favorable results, locating significant quantities of water, at depth, in fracture zones.

TABLE I

HYDROGEOLOGICAL STUDY - CHARACTERISTICS OF RECONNAISSANCE WELLS							MANANTALI RESETTLEMENT		
Site	Well No.	Depth of Casing(m)	Total Depth(m)	Water Encountered(m)	Yield Base of Casing (m ³ /h)	Potential Yield(m ³ /h)	Static Level	\$Specific Capacity	
DOWNSTREAM - RIGHT BANK									
Sonfara	F ₁	31	88	52.5, 67.2	1.3	0.63	10.45	0.063	
Bingassi I	F ₁	31	76	56.5, 61.3	3.8	2.6	16.29	0.26	
	F ₂	31	76	Progressive from 55 to 70	2.5	1.6	15.32	0.16	
Bingassi II	F ₁	31	82	Progressive from 34 to 70	1.5	0.54	3.07	0.054	
	F ₂	31	91	82.7, 85 to 87	4.3	1.6	4.49	0.16	
Kolonindala	F ₁	19	43.5	23, 38.5	8.7	5.8	3.95	0.58	
	F ₂	19	64	44.5, 49.4	1.8	1.3	5.12	0.13	
	F ₃	31	82	72.6	1.3	0.57	7.97	0.057	
Fardala	F ₁	22.3	70	24	2.2	1.6	8.27	0.16	
	F ₂	18	49	21.5, 23.3, 31, 35	2.3	2.2	7.58	0.22	
Mintegnan	F ₂	25	55	40 to 43, 45.6	4.7	3.6	11.83	0.36	
Keniekenie- dala	F ₁	22	100	Progressive	1.3	1.0	9.10	0.10	
	F ₂	19	49	18.5, 27, 28	12	10.0	7.32	1.0	
DOWNSTREAM - LEFT BANK									
Sobela I	F ₁	25	67	32 to 34	0.6	0.43	11	0.043	
	F ₂	25	61	54.4	2.5	1.7	9.95	0.17	
	F ₃	31	76	46.5	-	-	8.71	-	
Sobela II	F ₁	25	70	46	2.3	1.3	7.11	0.13	
Banfara	F ₁	22	55	41	2.7	1.6	5.58	0.16	
	F ₂	25	55	33	4.3	2.3	6.08	0.23	
UPSTREAM - EAST									
Nounkala	F ₁	31	70	58.3, 61	12	5.8	10.17	0.58	
	F ₂	39	73	44 to 45, 57, 65.5	12	4.1		0.41	
	F ₃	28	49	28 to 43	15.3	6.8	5.57	0.68	
UPSTREAM - SOUTH									
Kologo	F ₁	16	73	34.3	-	-	8.45	-	
	F ₂	40	76.8	68.6, 75.4	20.4	6.2	7.05	0.62	
Sitaninkoto	F ₁	22	59	17.5, to 22, 58.1	Artesian		Artesian		
Total and Avg		-26 Wells	26 meters	68 meters	46.069 meters	5.3 m ³ /h	3.7m ³ /h	8.31	

\$\$ Specific Capacity is the well yield per meter of drawdown below the static water level, in cubic meters per second per meter. Specific capacity remains fairly constant for moderate drawdowns and is reduced as the well is pumped at an excessive rate. Specific capacity is computed as the yield at the casing base divided by the difference between the casing depth and static water level.

\$ Potential Yield is assumed to be the well discharge or yield if a cistern is constructed ten meters below the static water level and is pumped to the bottom, or ten times the specific capacity. Pumping during peak demand periods may exceed potential yield but cistern storage is replenished during the night and times of little use.

7.2.4.3 DEVELOPMENT OF VILLAGE WATER POINTS

Of the many factors which must be considered in the selection of new village sites, none is more important than assuring an adequate water supply with the appropriate infrastructure to meet the village demands for water. Having identified the potential for the exploitation of groundwater resources in the resettlement zones, other criteria considered essential to the development of functional water points were the current patterns of water use in the villages, the present source of their water supply, the estimated daily consumption rates of all water users, the overall water needs of each village, and expressed preferences for the source of future water supply. The application of this data to the given hydrogeological conditions identified the possible options as well as restrictions in the development of water points for the new villages.

A. Existing Water Supply and Use

The project villages can be represented by three different patterns of water supply:

1. Villages which obtain water exclusively from the Bafing River;
2. Villages which obtain water from shallow dug wells;
3. Villages which obtain water from both the river and from wells.

Water use in the villages can be divided into domestic (drinking, cooking, and washing), gardening and livestock watering. Each of these uses have different characteristics, indicating somewhat different requirements for supply. At present, there are no improved village water systems in the project area.

Villages located within approximately one kilometer of the river fully depend upon it for water supply. Flow is perennial and the water quality is satisfactory from the perspective of dissolved solids and turbidity. No data is presently available regarding the sanitary quality of the river water.

Bathing and washing of utensils is done in the river, and water for drinking and cooking is carried back to the household. This aspect of water supply and use is exclusively the domain

of women. Water for cooking, drinking and other use is carried back to the village by women in galvanized steel tubs, usually with a net capacity of 30 to 40 liters. Each household has a small fenced water storage area in the household compound where carried water is stored in covered spherical earthen urns. Usually, tomatoes are grown on the fence around this area to take advantage of spilled water and the seepage through the slightly porous storage urns. Evaporation of moisture from the urn surface also effectively cools the water, especially in the dry months.

For these villages irrigated gardening is done on the slope of the river bank, or in small plots on top of the bank. Crops on the slopes take advantage of stored soil moisture after river recession, which is augmented by water carried from the river. Plots on the tops of the banks are watered exclusively by carried water. Watering of livestock is done at the river.

Villages situated away from the river use unimproved dug wells for all domestic and gardening use. Some water from these wells is used for goats and sheep, but cattle are generally herded to a surface source at some distance from the village or the river. Typically, each household or extended family unit will have a private garden plot located near the village with a dug well which is used for watering, as well as for water to be carried to the household for domestic use. Typical carry distances from well to household are between 100 and 500 meters, but can be as far as 1.5 kilometers during the dry season.

Family gardens vary between 100 and 200 square meters. The principal crop for these irrigated gardens (not to be confused with rainfed production of staples) is tobacco, with smaller amounts of vegetables such as onions, cabbage, and peppers. During the dry months (October thru May) there is no dependable rainfall. Water is applied directly to vegetables from the well using the calabash and rope. Random observations and measurements in several villages indicate application rates between five and ten millimeters per day (500-1000 liters/ 100m²).

In most cases hand dug wells are shallow holes, about one meter in diameter, sunk 3-5 meters into the beds of sand and clay. Shallow wells are dug rapidly, and multiplied in function to the village water needs. They are often numerous (up to 20 or 30) and found close to one another. The overall restriction to the depth and productivity of the wells is the shallowness of the topsoil layer,

the corresponding limited storage capacity of the soil and the underlying rock layer which is rarely penetrated. Water storage rarely exceeds 50-100 cm or a yield greater than one cubic meter per day.

The depth and longevity of these wells depend upon the resistance of the soils directly overlying the water table. With the advent of rains, the walls erode and caverns form, causing the sides to collapse. Few permanent wells were found in the existing villages; most have either to be redug or newly located each year

B. Inventory of Village Water Needs

The calculation of village water needs was based upon an inventory conducted by the DNHE study, observation and surveys by AID, and supplementary figures furnished by the Arrondissement of Bamafele and Kokofata. Estimates of domestic water consumption for the inhabitants in the project area indicate a higher use than many other areas in West Africa. This can be explained by the pattern of private wells or a perennial surface source within easy carrying distance of most households, which is not typical in rural West Africa. Estimates of per capita daily use in the project area for those who do not have access to a surface source for washing clothes, utensils and bathing are between 30 and 50 liters per day.

This coincides with the estimated consumption rate for people of 40 liters per day following figures in the World Health Organization publication, Water Supply for Rural Areas and Small Communities, by E.G. Wagner and J.N. Lanoix. This includes water for drinking, cooking, washing utensils and clothing, and bathing.

Therefore, daily consumption rates for humans and animals were decided as follows:

People: 40 liters per day
Sheep & Goats: 10 liters per day

Cattle can be herded to perennial surface sources for drinking in the traditional manner.

The population data needed for the calculation of daily water consumption was taken from the IER socioeconomic study financed by UNDP. This data was used to calculate the village water needs in Table VI. Population figures were increased by 10% as a margin of error for the study. These values were then increased by 2.5% per year until 1989 (total 15%) to account for future population growth.

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TABLE II
VILLAGE WATER NEEDS

	<u>Village</u>	<u>1983 Pop.*</u>	<u>Population Water Needs</u>	<u>No. Goats Sheep</u>	<u>Goats, Sheep Water Needs</u>	<u>Total Water Needs m3/day**</u>	<u>Wells Required</u>	<u>Present Water Source</u>	<u>Observations</u>
	RIGHT BANK								
1.	Soukoutali	325	16,440	225	2,850	19.3	2	River, Wells in hamlets	Gardening near river & wells
2.	Sekokoto	110	5,560	20	250	5.8	1	River	
3.	Keniekenieko	445	22,520	41	520	23	3	River	
4.	Nigui	294	14,880	12	150	15	2	10 Wells +; Seasonal Stream	Wells reach rock Avg. 4.5m
5.	Farabandi	400	20,240	64	810	21	3	10 Wells +; 100 Shallow Wells	Wells Avg. 12m along stream
6.	Firia	360	18,200	55	700	19	2	30 Wells +; 10 function	Wells reach rock Avg. 14.5m
7.	Kenieba	479	24,240	134	1,700	26	3	River; Wells are rare	
8.	Madinandi/Sandegnan	227	11,480	69	870	12.4	2	3 Wells; 20+	Wells reach rock Avg. 8.5m
9.	Tondidji	350	17,720	69	870	18.6	2	8 Wells; Shallow Wells at River	Wells reach rock at 11m; 9m at Riv
10.	Ganfian	212	10,720	94	1,190	12	2	4 Wells; Shallow Wells, River	Wells 11m; Shlw. Wells 2m - rock
11.	Kambou	173	8,760	11	140	9	1	River, Stream	
	LEFT BANK								
12.	Diarakoto	102	5,160	15	190	5.4	1	River	
13.	Souroufouga	62	3,120	37	470	3.6	1	3 Wells-dry; River	Wells Avg. 7m
14.	Kouroukondi	204	10,320	69	870	11	2	River & 15 Wells	Avg. 5m - do not reach rock
15.	Barlakourou	237	12,000	62	780	12.8	2	20+ Wells	Wells reach rock 8m: yield 900l/d

* Based on UNDP-financed IER Study

** Human and animal needs increased by 10% for margin of error in IER Study and 15% for population growth until 1989.

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RESETTLEMENT

TABLE II (cont)

VILLAGE WATER NEEDS

Village	1983 Pop.	Population Water Needs	No. Goats Sheep	Goats, Sheep Water Needs	Total Water Needs m ³ /day*	Wells Required	Present Water Source	Observations
LEFT BANK (cont)								
16. Tintilla	251	12,720	98	1240	14.0	2	100 Wells, 10 w/water	Yield 300 l/day
17. Konkorma	299	15,120	79	1000	16	2	20 Wells & River	Wells Avg. 5m
18. Bamafele	573	29,000	166	2100	31.0	4	River & 200 Wells	Wells reach rock Avg. 6.5m - little Water
19. Marena	467	23,640	135	1710	25.4	3	12 Wells; Animals to River	Wells 6-9m, some reach rock
20. Diokeli	402	20,360	187	2370	22.7	3	12 Wells;	Wells Avg. 10m some reach rock
21. Samantoutou	68	3,440	12	150	3.6	1	10 Wells;	Wells Avg. 9m at rock
22. Konlakara	130	6,560	58	730	7.3	1	10 Wells; 6 give water	Wells Avg. 8m
23. Ougoudinko	433	21,920	190	2400	22	3	20 Wells	2m ³ /day - Avg. 15m, no rock
24. Coumbalan	257	13,000	117	1480	14.5	2	100 Wells - most go dry	Wells reach rock Avg. 7m
25. Bakioke	333	16,840	154	1950	18.8	2	15 Wells & River	Wells reach rock Avg. 10m
26. Kourondi	50	2,520	19	240	2.8	1	4 Wells - 2 go dry	Wells reach rock Avg. 7m
27. Bantandjoke	178	9,000	43	540	9.5	1	10 Wells	Avg. 10m
28. Solo	893	45,200	135	1700	47	3**	26 Wells, Seasonal streams	Some reach rock Avg. 6m
29. Bambouta	229	11,600	84			2	River & 3 Wells	Avg. 6m
30. Gouagoudala	297	15,040	31	390	15.4	2	River	8m: yield 900l/d
31. Sitafeto	323		14	180	16.4	1**	River	

** Villages not to be moved, nor wholly dependent on new water sources require 1/2 number of wells.

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TABLE II (cont)

VILLAGE WATER NEEDS

<u>Village</u>	<u>1983 Pop.</u>	<u>Population Water Needs</u>	<u>No. Goats Sheep \$</u>	<u>Goats, Sheep Water Needs</u>	<u>Total Water Needs m³/day*</u>	<u>Wells Required</u>	<u>Present Water source</u>	<u>Observations</u>
33. Kologo	255	12,920	54	680	13.6	1**	Wells	
34. Diba	234	11,840	105	1330	13.0	2	River	
35. Sitaninkoto	566	28,640	116	1470	30.0	2**	River	
36. Koba	<u>241</u>	<u>12,200</u>	<u>200</u>	<u>2530</u>	<u>14.5</u>	1**	Wells	
37. Sobela	(Host Village)					1		
38. Nantela	(Host Village)					1		
39. Faradala	(Host Village)					1		
40. Nounkala	(Host Village)					<u>1</u>		
TOTAL WELLS						72		

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C. New Village Water Supply System

Many types of water systems can be considered for different types of water needs. Some, such as motorized pumps and pressure systems, can be easily eliminated as inappropriate in the project area due to lack of ability for operation and maintenance. Other systems offer distinct advantages and disadvantages, with the final choice being a weighed solution, given all the social, technical, health and cost factors involved.

1. Design Considerations

The options considered for domestic water supply are:

1. small diameter drilled wells with manual pumps;
2. large diameter dug wells, cased, sealed and fitted with manual pumps and an access cover for emergency use with a bucket;
3. large diameter dug wells, cased, with apron and raised wall, open for use with buckets, or
4. small diameter drilled wells connected to an adjacent large diameter dug well serving as a cistern for water storage, cased, and open or with access cover for use with buckets.

Option 1. has the advantages of the least chance of contamination or going dry, can be installed rapidly and is the least costly, but is wholly dependent on the functioning and maintenance of the pump. Pump programs are plagued with problems stemming from a combination of the sociological habits and cultural beliefs of the communities using the wells, the implementing agency and the organization (or lack thereof) of the pump installation and maintenance program, the unreliability of present handpump design under a range of variable conditions, and the high cost of repairs and maintenance, consequently leaving a high percentage of wells out of use at any given time. This situation would be particularly unacceptable at the new village sites where no alternate source of water is available. As long as the use of pumps has not become a custom and their maintenance program a routine operation, large diameter dug wells remain the only sure means of supplying water to a population.

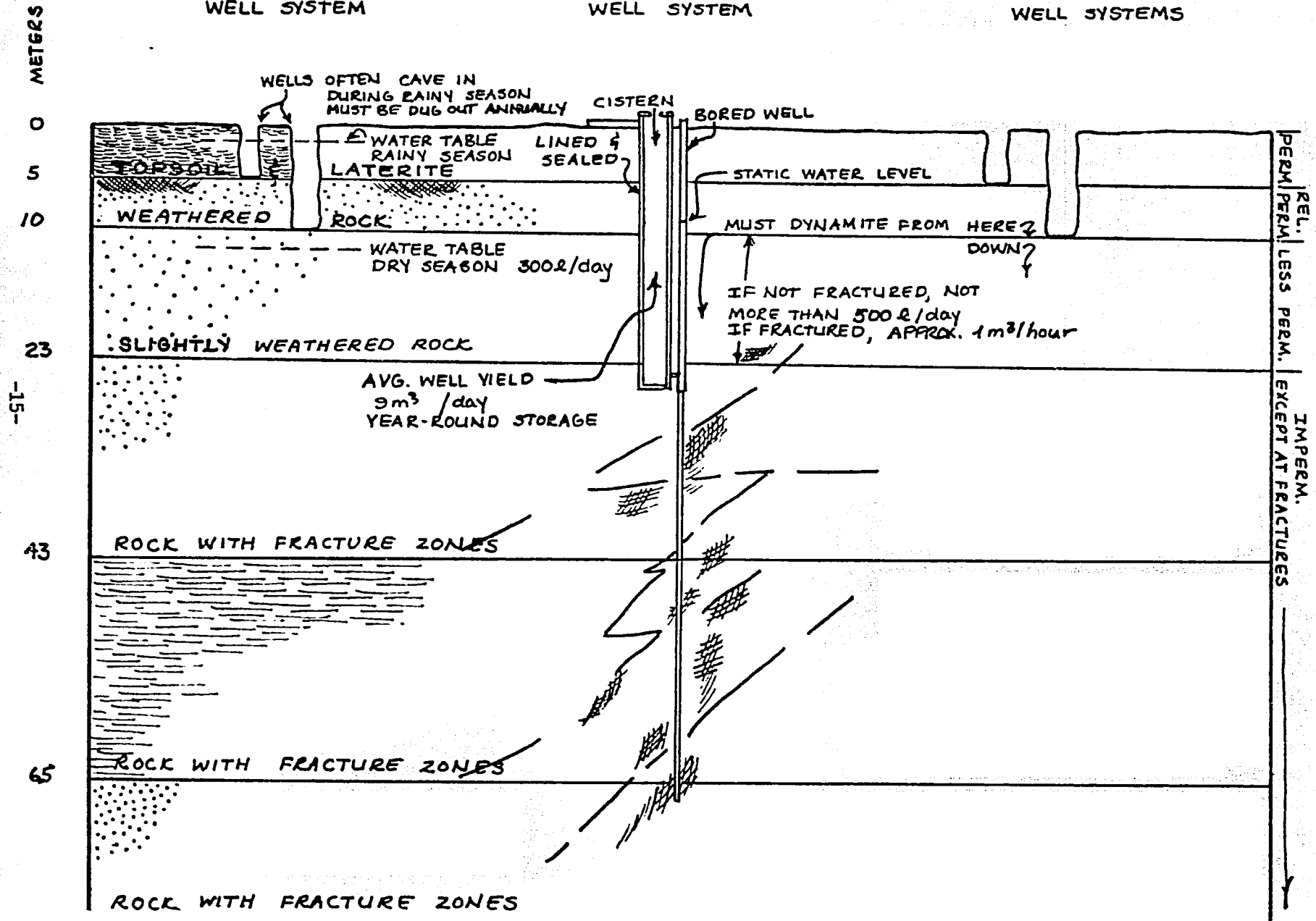
FIGURE II

COMPARISON OF WELL SYSTEMS

PRESENT UNIMPROVED
WELL SYSTEM

PROPOSED IMPROVED
WELL SYSTEM

SUPPLEMENTARY
WELL SYSTEMS



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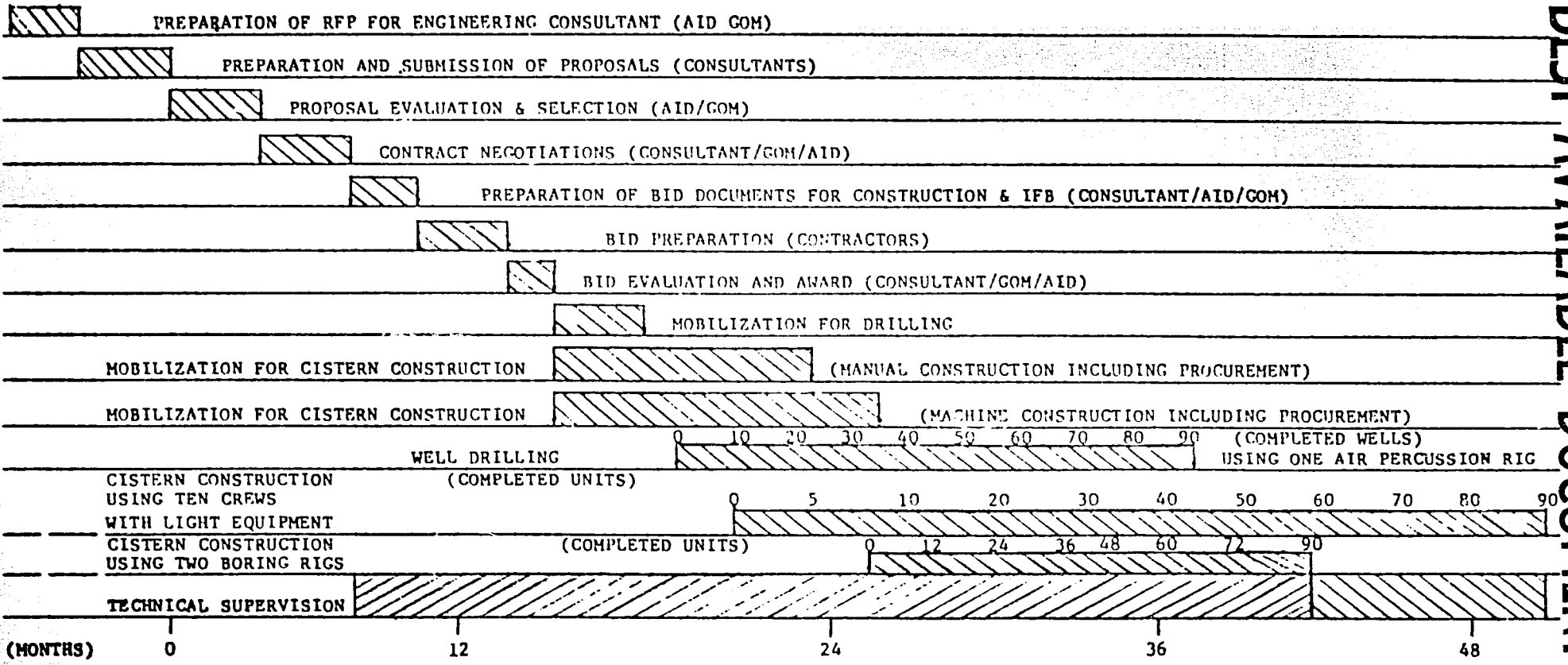


FIGURE III
 MANANTALI RESETTLEMENT
 IMPLEMENTATION PLAN FOR VILLAGE WATER SUPPLY

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Option 2. has the same disadvantage as option 1. as far as the unreliability of pumps, but allows for emergency access to the water source with buckets. In this manner, the village is always assured access to its water supply. The overriding disadvantage of dug wells, however, would be the low well yield, as the upper groundwater aquifer is not productive enough to meet more than individual family needs, due to the thin topsoil layer and the generally impervious sandstone beds. This, coupled with the depletion of the aquifer during the dry season, make for an unreliable year-round water source as well. In order to meet an entire village's water needs, dug wells would have to extend to significant depths where water is trapped in subterranean aquifers. the variability of depth at which fractures occur and the variability of output would make this system prohibitively expensive, with measurable yields (greater than $1\text{m}^3/\text{hour}$) encountered at an average depth of 46 meters, and some as deep as 80 meters. There is a significant difference in cost and time for execution of a well of 20 meters, 50 meters and 80 meters. The necessity to multiply the number of wells if an adequate yield is not obtained is an unknown factor which could have serious implications.

Option 3. has the advantage of permitting the greatest numbers of users to draw water at the same time, being completely open, but has a greater chance of becoming contaminated from dirty buckets or debris. As a dug well it has the same disadvantage as option 2.

Option 4. combines the advantages of the preceding three options, with few of the disadvantages. The drilled well taps the water source at a depth which has sufficient yield. A cistern is constructed adjacent to the drilled well to a depth several meters below the static water level in the well. A horizontal connection is made between the bottom of the cistern and drilled well to allow water to flow into the cistern by gravity. The cistern is in the form of a vertical concrete cylinder one to two meters in diameter and open at the top, permitting users to draw water by traditional means. The depth of the cistern depends upon the characteristics of the drilled well and in particular the static water level and specific capacity. The cistern must be deep enough to assure sufficient yield and storage during periods of minimum water level in the aquifer. More details on the design of this system are given in the following section on well design.

2. Cost Considerations

Option 1. drilled wells with manual pumps may have the lowest initial investment to produce an exploitable water point, but would become less and less cost effective with time, as repair and

maintenance become major obstacles in a rural area. Moreover, there is no way to measure the cost of human inconvenience and hardship at the breakdown of a pump and consequent loss of water supply where there is no alternate source of water available. For this reason, the lower cost is not considered initiative enough to recommend this type of system. Therefore, option 1. is eliminated due to the certainty of pump breakdown, the resulting crisis of no alternate water source, and the insurmountable problems anticipated in implementing and administering the necessary pump maintenance program in an area as remote as Manantali.

Options 2 & 3. Large diameter dug wells with the constraints of local hydrogeological conditions, are limited to fracture zones, as a shallower well in the upper groundwater aquifer would not obtain a sufficient yield to approach, satisfying a village's water needs. Deeper dug wells to subterranean aquifers are considered equally inappropriate, however, with the high cost per meter and the risk of producing dry wells or continuing to great depths to obtain a favorable yield. Though recurring costs of this type of system would be few (repairs are not needed, and maintenance would depend upon a contentious health education program), the initial investment would be monumental, and due to the unknown parameters, the least cost effective.

Option 4., a drilled well connected to a dug well and cistern is retained as the appropriate water supply system, as it is technically sound, efficient, respects traditional water use habits, and is a reasonable compromise cost-wise between drilled wells and deep dug wells. It is the most sure means of producing sufficient quantities of water to support village populations at their new sites, with no alternate domestic sources readily available. It should also be noted that several people can draw water simultaneously from the cistern, at a rate considerably greater than one handpump on a drilled well. A comparison of the existing well systems and the proposed well system, with their corresponding well yields is shown in Figure II. Cost estimates are given on Table VII.

3. Alternate Water Sources

Other types of water needs considered are for gardening and for the watering of animals. Possible options for garden irrigation systems would be diesel or manual pumps from wells or surface sources. Neither of these are deemed practical though, due to the advanced technology involved with proper operation and maintenance, the very small plot size, and restriction of mobility of garden sites.

TABLE III

COST ESTIMATES FOR DOMESTIC WATER SUPPLY
MANANTALI RESERVOIR RESETTLEMENT

<u>Item</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total</u>
Drilled Wells*	72 units	\$15,167	1,092,000
Cisterns**	72 units	16,000	1,152,000
U.S. Source Premium			500,000
Water Pumps/Installation***			40,000
Subtotal			2,784,000
Inflation (7% one year)			194,880
Contingency (15%)			446,832
Total			3,425,712

* Unit cost was estimated using an average well depth of 65 meters at \$200 per meter for completed wells and \$100 per meter for the 24 dry holes expected with 75% success rate. Unit cost data is estimated from active work in Mali and Togo.

** Cistern costs are estimated assuming an average depth of 20 meters, a unit cost of \$750 per meter, plus \$1000 for wall and apron construction. These costs assume local construction techniques and were estimated from current construction in Mali. Cost data are not available using heavy boring equipment.

*** Submersible electric pumps with generators, or manual pumps to be installed on 25 positive test boreholes and project-fund boreholes at village sites to supply water for construction.

It will be more appropriate to locate villages near surface sources and exploit the upper groundwater aquifer by digging shallow wells for garden plots in the traditional manner.

D. Well Design

As already described, the type of system selected for the primary water supply is the cistern well. A tubewell is drilled with standard rotary or air-percussion equipment. This takes a few days at most. When its yield is measured and hydraulic characteristics tested and found suitable, a cylindrical vertical cistern or reservoir is constructed adjacent to the tubewell with its bottom at some point below the water level in the tubewell. A horizontal connection is made between the reservoir and tubewell to allow water to flow into the reservoir. The top of the reservoir or cistern is constructed in the same way as an open dug well so buckets can be lowered for drawing water. A diagram of this type of system is shown in Figure II. This type of system is currently in practice in Mali and recognized for its appropriateness in the local conditions.

The tubewell is constructed to acceptable standards and practices for potable water supply. All drilling logs, as built plans and pump-testing records of the wells should be retained for future reference in maintenance or up-grading of the water supply system. Wells in unconsolidated or unstable aquifers should be screened with a proper slot size to prevent entrance of fine material into the well, and gravel packed if necessary. Screens should be of a durable, non-corrosive material and have enough slot area to assure that entrance velocities are not excessive.

Wells should be cased down to the screen or into bedrock with durable, non-corrosive pipe. The casing diameter should be large enough (150 mm) to install standard pumping equipment if needed at a later date. The bottom of the casing should be sealed to the borehole with an appropriate packer, stabilized with gravel or sand and grouted in place. The tubewells should be capped with a rugged, tamper-proof top which can be removed for access and potential future use.

The cisterns or reservoirs may be constructed of pre-cast reinforced concrete pipe sections or cast-in-place. (See figure III). The former may be faster and cheaper and the latter stronger and more durable. In either case the bottom and walls must be sealed to prevent inflow of water or contaminants from the superficial aquifer, or leakage of the well water into intersected fractures.

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The cistern diameter should be large enough so several water drawers can use it simultaneously; (1.8 meters). The top of the cistern must have an appropriate protection wall to prevent debris, dirty water, animals and people from falling in. A heavy apron should also be constructed around the wall above natural grade and sloped away from the well. The apron provides a clean, stable place for water drawers to stand and place their containers and ropes. There should be a collection drain around the apron and drain field to dispose of spilled water.

A concrete watering trough for livestock can be constructed in proximity to the dug well, as deemed needed by the villages. Proper drainage must be assured in the trough to facilitate periodic cleaning. The well should be enclosed by a sturdy fence or wall, with the trough outside, to impede animals from entering the well area.

Two options may be considered for drawing water; households may use personal ropes and buckets, or permanent community ropes and buckets fixed to the well. Personal ropes and buckets may not be stored in clean areas, and are placed on the well apron before and after use. A possible improvement is to construct a heavy steel beam over the cistern and attach one or more heavy steel pulleys. Heavy ropes through the pulleys are permanently attached to the steel beam frame at one end and a durable bucket at the other. As water is drawn, the rope slack goes down the well, as opposed to on the apron, avoiding contamination. This system also somewhat increases the potential capacity of an individual drawer as it is easier to pull a rope down from the pulley than up from the well.

The depth of the cistern is determined by the hydraulic characteristics of the drilled well. The bottom of the cistern must be deep enough below the static water level to assure adequate yield and/or storage. Five meters below the static water level at the end of the dry season is considered a minimum. For wells with a specific capacity less than $0.3 \text{ m}^2/\text{hr}$ (5 liter/min/meter) the cistern depth below the static water level should be increased. For budgetary purposes, 20 meters is considered the average required depth estimated for the cisterns.

Water System Capacity

The number of people which can be served by a water system may be determined by one of three limiting factors; the yield of the well, the rate at which people can draw or pump, or the distance which they must carry water between the well and house. Typically, the peak demand for water use is early morning and late afternoon. Drawers of water have many other activities which preclude them from being able to draw at any time of day, or being able to wait for long periods in a line. Therefore, each system should be designed with a maximum net daily operation time between four and six hours. Otherwise, village requirements will not be met. Reasonable maximum carrying distances should be about 500 meters.

A typical drawer of water can pull about 50 liter-meters per minute with a loose rope and local rubber bag. In other words, the drawer can lift about five liters per minute from a depth of ten meters. If six simultaneous drawers can work comfortably around a cistern of 180 cm diameter, and a water depth of ten meters, they can draw about $50 \times 6 - 10 = 30$ liters per minute or 1.8 cubic meters per hour. Based on five hours of use per day, a well could supply about nine cubic meters per day. If a village's water needs are equal to or less than the well's capacity, one water point would be sufficient for their needs. If the well capacity is less than the demand, additional water points will be necessary. Based on the figures of population, water requirements and well capacity, the number of required wells are calculated in Table VI, to be 72.

Water Pumps for Construction Needs

Water will be needed at the new village sites for the construction of the warehouses, the social and administrative infrastructure, the wells, and village housing. To satisfy water needs prior to village relocation, twenty-five boreholes -- test bores and project funded bores -- will be equipped with either electric or manual pumps to evacuate water.

Submersible electric pumps offer the advantage of fast evacuation plus portability -- that is, they can be moved from one bore to another. They require an electricity generator to power them and thus present logistical complications.

Manual pumps would be more suitable for a semi-permanent supply. Their evacuation capacity is limited but they may prove to be more reliable mechanically. Further, they require no generators or fuel.

Whether manual or electric, the pumps may be moved from one site to another as necessary. Since no maintenance or repair capability or infrastructure currently exists in the project zone, none of the pump installations are planned as permanent.

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E. Implementation Plan

Due to the time constraints for project implementation set by the filling of the reservoir it is essential that a workable implementation plan be drawn and adhered to. The plan for water must be coordinated and integrated into the overall implementation plan including building construction, transportation and resettlement.

The first task to be undertaken will be the selection of existing positive test boreholes located at or near new village sites. These will then be equipped with pumps to provide water for construction needs. Since the positive test bores will probably not be able to supply enough water, some project-funded boreholes will also need to have pumps installed. The plan for selection and pump installation will have to be drawn up by the RPU in collaboration with contractors who will execute the various construction activities.

About 72 operational water systems are needed, each of which consists of a drilled well and adjacent cistern. The success rate for drilled wells in the area is about 75%, indicating that about 96 wells will be drilled to obtain 72 with sufficient quantities of water. Since cisterns are constructed only after a well is tested positive, about 72 will be needed.

Drilled wells are constructed using standard rotary or air percussion rigs. A good rig and crew can complete one or two wells a week, including down time and moving.

Cistern excavation and construction can be done either by traditional methods using manual tools, compressed air hammers, and dynamite, or by using large boring equipment. Using traditional techniques, one crew can complete between two and three cisterns per year, depending on depths and materials penetrated. A large boring machine can complete a cistern in a week to ten days, assuming pre-cast rings are used for lining.

The choice of construction methods for the cisterns could be critical for implementation and each has its own advantages. Manual methods are currently in use in Mali, albeit not to the scale needed for this project. There are organizations and manpower with experience in these techniques. There is a certain safety factor using multiple crews and brigades of small equipment as opposed to one or two pieces of large equipment, whose failure, in a remote place could be disastrous to the implementation schedule. The primary advantages of using large equipment is potential speed, and the technical competence and reliability of a larger international contractor.

No cost data is available to date on construction using large boring equipment. Expressions of interest are presently being solicited in the Commerce Business Daily.

If a large international contractor is selected for cistern construction, the drilled well component should also be part of his contract in order to minimize problems of coordination, construction standards and to maximize the incentive for mobilization.

An appropriate system must be set up to coordinate, monitor and approve installation of the pumps and construction of the wells. Personnel with experience in water well construction and groundwater hydrology will be needed. Construction should be monitored by a groundwater and wells expert aided by two on-site field technicians. These three people should serve for three years to provide necessary monitoring. This will ensure that the wells construction and pump installation and testing meet the required standards and specifications.

7.2.4.4 SCOPES OF WORK MANANTALI RESETTLEMENT WELLS CONSTRUCTION ACTIVITY

About twenty-five pumps will be installed on boreholes and 72 water supply systems will be constructed to provide water to some 11,000 who will be relocated from the area to be flooded. Each system will consist of a small diameter drilled well connected to a larger and shallower adjacent cistern (between 1 and 2 meters diameter) for storing and drawing water supplied by the drilled well. The cistern is excavated adjacent to the drilled well to a depth several meters below the static water level in the well. A horizontal connection is made between the bottom of the cistern to the drilled well allowing groundwater to flow into the cistern by gravity. The drilled well is capped and water is drawn from the open cistern by buckets and rope, eliminating the need for handpumps.

A. Short Term Consultant (2PM)

This individual will be a hydraulic engineer, rural engineer, or wells specialist with no less than three years field experience in the construction of cisterns and boreholes. Experience in Africa, preferably the Francophone Sahel, is required as is French language capability at the level of FIS R3, S3 tested within the past six months. The consultant will be asked to undertake two tasks. First, he/she will prepare complete designs and specifications for the water supply systems and pump installations. These will include, but not be limited to:

1. Well Drilling and Logging Techniques, including penetration rates, material sampling and analysis, and pumping tests for yield. The pump test methods and minimum yield required for completing a well shall be specified in detail.
2. Details of small diameter well design and specifications, including casing diameter and material; screen diameter, material, slot type and size, length and location; requirements and materials for gravel packing and stabilization; design and specifications for grouting and capping the wells.
3. Cistern design and construction including diameter, wall and bottom thickness and materials, joint construction and sealing. The design shall include an appropriate apron, top wall and drain. The most appropriate method for drawing water shall be specified and considered in design (i.e. permanent ropes and buckets attached to a beam and pulleys, or individual ropes and buckets). Criteria for required depth of the cistern shall be made based upon static water

level, water level fluctuations, well yield and water requirements. Design shall include the connection between the cistern and well. Design and specifications prepared by the consultant shall be reviewed and approved by GOM and AID.

4. Choice of appropriate (location and output) positive test boreholes, suggestion of project-funded borehole drill sites so that pumps may be installed and water provided for construction early in the project.

5. Planning of tentative implementation timetable.

The consultant's second task will be the preparation of bid documents and Invitations for Bids for the water systems, based on the design and specification.

B. Long Term Consultant (36 PM)

Technical and linguistic requirements for this individual will be the same. However, he/she should also have the social/cultural skills which will enable the consultant to live at Manantali for three years and work with Malian personnel and counterparts on a daily basis.

The consultant shall coordinate and monitor all phases of the pump installation and wells construction. He/she shall act as liaison for the water systems construction to coordinate and link these project components with all other activities. The consultant will work with two on-site wells construction technicians. He/she will be responsible for sampling and analyzing materials and preparing well logs and pump test reports. These reports shall be turned over to appropriate agencies in Mali for retention.

Upon completion of each water system the consultant shall carry out a final inspection to ascertain if it meets requirements and specifications. Completed units meeting requirements shall be approved by the consultant in writing to GOM and AID. The consultant shall also provide an as-built drawing of each system, with location and Identification marks.

A sample implementation schedule is shown in Figure III. The dates are left open, since they are contingent upon approval of this project paper and signing of the PROAG. The plan makes it obvious that it is critical to begin as soon as possible in order to meet deadline of a full reservoir in 1987.

7.2.5 ANNEX: VILLAGE RECONSTRUCTION

7.2.5.1 DESIGN CONSIDERATIONS

- A. Settlement, Concession, and Household
- B. Village Inventories
 - 1. Traditional Structures
 - 2. Above Standard Public, Private and Village Owned Buildings
- C. Building Systems Used in Traditional Village Construction
- D. Availability of Local Building Materials
- E. System Retained for Building Construction
 - 1. Block Production
 - 2. Suitability and Testing of Soils
 - 3. Laterites
- F. Cost of Materials for Village Reconstruction
- G. Cost and Availability of Labor

7.2.5.2 METHOD OF VILLAGE RECONSTRUCTION AND COST ANALYSIS

- A. Village Groupings and Resettlement Zones
- B. Constraints on Reconstruction
 - 1. Geographical Situation
 - 2. Dam Construction Schedule
 - 3. Access Roads
 - 4. Water Availability
- C. Reconstruction Policy
 - 1. Construction of Houses (Sleeping Quarters)
 - 2. Provision of Building Materials for Construction of Supplementary Structures
 - 3. Reimbursement of Above Standard Private or Village Owned Structures
 - 4. Construction of Public Buildings
- D. Organization of Village Construction Sites
 - 1. Sequence of Tasks for Village Reconstruction
 - 2. Scheduling of Construction Activities
- E. Contracting Options and Cost Analysis
- F. Total Construction Costs

FIGURES

- I: Typical Concession
- II: Plan of Household
- III: Abbreviated Implementation Plan

TABLES

- I: Inventory of Physical Structures in Villages
- II: Total Quantities of Physical Structures Inventoried
- III: Materials Estimate for House Construction
- IV: Materials Estimate for Granary Construction
- V: Materials Estimate for Kitchen Construction
- VI: Materials Estimate for Chicken Coop Construction
- VII: Materials Estimate for Livestock Shelters
- VIII: Phase I of Village Construction
- IX: Phase II of Village Construction
- X: Cost Options/Alternatives

7.2.5. ANNEX: VILLAGE RECONSTRUCTION

7.2.5.1. Design Considerations

The information used to determine the most feasible system of building construction for villages to be displaced was gathered through village interviews and a thorough reconnaissance of the project area. Investigations and surveys have been conducted since the first study done by Groupement Manantali in 1977. Research by the USAID PTD team began in 1981, followed by further investigation of traditional village habitat and construction methods, inventories of physical structures, and an approximation of the cost quantities and availability of appropriate building materials necessary for village reconstruction. These elements have all been considered in the light of village needs and desires, time constraints and project goals.

A. Settlement, Concession, and Household.

The dominant form of Malinke settlement in the project area is a small to medium-sized village with populations of 150-200 and 350-400, respectively.

The extended family is the basic kin unit in the village, and the spatial/structural unit is the concession.

Each concession is composed of one or more nuclear family households. The size thus varies according to the number of households. Each concession thus contains houses, granaries, kitchens, chickencoops, livestock pens, work shelters (e.g. for blacksmiths), and perhaps fetish structures, depending on the social status of the lineage and numbers of family members.

Each married male and every married woman with children has his/her house. Young children share the house of their mother and older siblings share a separate dwelling of their own.

The spacial arrangement of housing in the concession present the general pattern of a circular courtyard with houses built at the perimeter, openings facing the center (see Figure 1). Granaries, kitchens, and other structures will generally be set behind or between houses. The courtyard is the focus of most domestic activities - both work and leisure. Except during the rainy season, most cooking is done outdoors. Houses thus are essentially sleeping quarters.

The majority of houses are made of circular walls of mud with an average diameter of 4-4.5 meters and a height of 1.80 meters. Walls are either raised directly on hard, compacted soil, without foundations, or in some cases on a row of blocks laid cross-wise as a base. The thickness of the mud walls is approximately 10-20 cms, depending on the type of construction. Walls can be constructed of successive rows of mud blocks formed from traditional molds, or of wattle and daub, where a woven bamboo frame is packed on both sides with mud. The walls are then covered with a thin, fine plaster made from the earth of termite hills. The roof is conical in shape, composed of a bamboo framework secured together by vegetal fibers, and covered with thatching. It is constructed on the ground and once assembled raised on the walls. The height of the roof is approximately 1.70 meters giving the hut a total height of 3.50 meters. The floor of the hut is stamped earth. This work as well as the plastering of the walls is reserved for women. In general, there is a single opening although

in some cases you find two openings diametrically opposed. Openings for windows are rare.

Granaries are likewise constructed out of mud block or plastered bamboo. They are raised approximately 50 cms off the ground on stacks of large rocks and supported by traversing beams of wood. This is necessary for protection from insects and animals.

Most other structures in the concessions, i.e. kitchens, and animal shelters, are usually constructed of woven bamboo. Water storage areas and showers are defined by wood or straw enclosures or simply an area tucked between other built structures. Sitting or meeting areas are generally wood posts and slats, with or without straw roofs. A plan, elevation of section of structures in a sample household, are shown in Figure II.

The spatial organization found on the level of concessions is also reflected on the overall level of the village, of which the following types can be distinguished;

1. The village composed of concessions grouped in a circle around a common center,
2. The village composed of clusters of concessions,
3. The village with no discernable order,
4. The village with dispersed, isolated concessions , separated by open spaces.

Traditional habitat and spatial organization on the level of the concession and the village are essential factors to be considered design and establishment of the new villages.

B. Village Inventories

In an effort to evaluate material quantities and construction needs, as well as investigate the methodology and procedure necessary for the village inventories to be carried out at critical stages of the resettlement process, inventories of physical structures in 22 of the 30 project villages were conducted. The remaining eight villages were physically inspected and categorized according to other villages with similar populations.

Building functions were identified and detailed measures were taken of structure diameters, heights, and types of materials and quantities used. After arriving at a method of standardizing the types and sizes of buildings found, structure categories were developed and buildings tabulated accordingly. This was accomplished by covering the villages concession by concession and interviewing heads of households. Public buildings and privately owned modern structures are addressed in the next section.

1. Traditional Structures

The combined inventories of all traditional structures presently existing in the 22 villages are shown in Table I. Broken down into categories by the type of structure, the following averages and statistics were found:

a. Houses (Sleeping Quarters)* (taken from sample of 500 houses)

Average Interior Diameter: 4.50 meters
Average Wall Height: 1.80 meters
Average No. of blocks: 600 §
Average No. of Bamboo Poles: 80
Average No. of Straw Bundles: 12 (4 stacks to a bundle)

In general, houses vary between three distinct size categories:

1. Small: 3.50 - 4.00 meters
2. Medium: 4.10 - 4.50 meters
3. Large: 4.60 - 5.0 meters

b. Granaries * (taken from a sample of 400 granaries)

Average Interior Diameter: 3.50 meters
Average Wall Height: 1.40 meters
Average No. of Blocks: 350 §
Average No. of Bamboo Poles: 60
Average No. of Straw Bundles: 8 (4 stacks to a bundle)
Average No. of Rocks: 60
Average No. of Wood Beams: 10 (2.5 - 3.0 meter lengths)

In general, granaries vary between three distinct size categories:

1. Small: 2.10 - 2.60 meters
2. Medium: 2.70 - 3.20 meters
3. Large: 3.30 - 4.00 meters

c. Kitchens (taken from a sample of 75 kitchens)

Average Interior Diameter: 3.80 meters
Average Wall Height: 1.60 meters
Average No. of Blocks: 400 §
Average No. of Bamboo Poles: 60
Average No. of Straw Bundles: 8 (4 stacks to a bundle)

In general, kitchens vary between two size categories:

1. Small: 3.40 - 3.80 meters
2. Large: 3.90 - 4.20 meters

d. Chicken Hutches (taken from a sample of 100 chicken hutches)

Average Interior Diameter: 1.80 meters
Average Wall Height: .60 meters
Average No. of Blocks: 100 §
Mud Roof

In general, chicken hutches vary between 1.50 - 2.00 meters.
and a height of .50 - .80 meters.

§ Block dimensions taken as approximately 30 X 15 X 10 cms.

* Fetish houses and forges were counted among houses or granaries

e. Livestock Pens: (taken from a sample of 50 livestock shelters)

Average Interior Diameter: 3.50 meters

Average Wall Height: 1.4 meters

Average No. of Blocks: 350 \$

Average No. of Bamboo Poles: 50

Average No. of Straw Bundles: 8 (4 stacks to a bundle)

In general livestock shelters vary between 3.40 - 4.00 meters

As the limited amount of time available for field research did not permit for inventories of all 30 project villages, a method of extrapolation was adopted according to population figures in order to arrive at structure estimates in those villages not inventoried. The following averages of structure type per inhabitant were determined:

- . one house for each 2 inhabitants
- . one granary for each 3 inhabitants
- . one kitchen for each 20 inhabitants
- . one chicken hutch for each 14 inhabitants
- . one livestock shelter for each 33 inhabitants

- . 18 inhabitants per concession

These formulas also helped in the estimation of the number of structures for villages not inventoried.

The total number of each type of physical structure for all villages is presented in Table II. These figures were then increased by 10% to include a margin of error, (except in the case of the granaries which were increased by 20% in order to include the large number of granaries found in the fields and not counted as part of the village inventories.) The estimated composite total of each type of structure in the 30 villages is as follows:

- . Houses (Sleeping Quarters) : 4423 rounded to 4500
- . Granaries : 2870 rounded to 3000
- . Kitchens : 430 rounded to 450
- . Chicken Hutches : 612 rounded to 650
- . Livestock Shelters : 271 rounded to 300

According to the averages found, structures in a typical village are distributed in the percentages below:

	<u>Average % of Total Village Structures</u>	<u>Highest % Inventoried</u>	<u>Village of Highest %</u>
Houses	53	68	Soukoutali - (expanded due to housing of dam workers)
Granaries	32	46	Kambou
Kitchens	5	11	Nigui
Chicken Hutches	7	10	Dialakoto, Nigui
Livestock Shelters	3	8	Konkorma, Souroufouga

2. Above-Standard Public, Private and Village Owned Buildings

Though the majority of village structures are of the traditional style, other buildings of above-standard construction were encountered. These consisted of improved banco or stone houses, schools, mosques, a Protestant mission, and government buildings at the arrondissement (Bamafélé). A cement block reinforced concrete warehouse and lodge also exist at the arrondissement. In each case detailed measurements were taken and building materials noted. The problem of the replacement of these buildings is addressed further on in the section on Reconstruction Policy.

C. Building Systems Used in Traditional Village Construction

During the first visits to project villages in preparation for the USAID Project Identification Document, different options for reconstruction were presented as follows:

1. Monetary reimbursement for their building losses, leaving the villages responsible for the purchase of materials and construction of their new homes;
2. Government furnishing them with new homes; or
3. Government assistance to help reconstruct, provide them with building materials, and provide technical assistance necessary for the reconstruction of their villages.

All villages exhibited the preference for the third option and have retained this choice during all subsequent interviews. In many cases, the adamant desire to build for themselves is to give them the maximum control possible over their future move. Some villages are preoccupied with the idea that foreigners will takeover their present village sites if they should leave. Villages also felt very strongly about their new village being identical to their old village. By building themselves, they would have maximum control over these factors.

As previously described, the basic systems of building construction are wattle and daub, and mud block. The wattle and daub method of house construction consists of a verticle framework of poles with bamboo woven between the poles to form a surface on which to apply mud plaster, which is packed onto both sides of the bamboo. The advantage of this system is that it can be constructed relatively quickly. The disadvantage is that it requires a lot of maintenance due to shrinkage cracks.

House construction of mud blocks consists of fabricating mud blocks in the traditional manner on the ground with open wood molds. The mud mixture can be simple, or it can contain broken up vegetal matter. The blocks are left to dry for at least a week and then raised in tiers joined by mud mortar. Walls are usually plastered to render the surface smooth and protect them from the weather. The advantage of this system is that it is more durable than wattle and daub, and requires less maintenance, as most shrinking and cracking occurs during the curing of the bricks. The interiors of the houses also tend to stay cooler due to the increased thickness of the walls. The disadvantage is that more labor and time are required for the fabrication of the bricks of the walls.

D. Availability of Local Building Materials

The materials which are available year-round are earth and wood, though weather can affect the ability to transport them. Earth for the fabrication of building blocks is abundantly available, especially where borrow pits have already been established for the construction of the access road from Mahina to Manantali and for the dam earth-works. Some lateritic soils have already been tested for their suitability and are currently being used in the building construction near the resettlement area. (Soils are further discussed under Block Production).

Wood for door lintels should also be abundantly available when wood clearing within the reservoir limits begins. In cases where doors must be replaced, wood should also be available in sufficient quantities, either from what is cleared from new village sites and fields or from what may be cleared from within the reservoir area.

An available supply of bamboo will be an important factor in village reconstruction. Bamboo grows wild in certain areas, mainly uninhabited. Villagers must often travel great distances to collect bamboo and consequently reserve bamboo most often for construction of roof structures. It was signalled by certain villages that although it was once available in large quantities, the supply of bamboo is less than in years past. The large quantities of bamboo in the project area, especially in the zones of Goungoudala-Niarekira and Konkoukoutou, might be sufficient for building needs, if it is collected before it rots. In any case, bamboo available for cash purchase should be sufficiently available.

Thatch is expected to be available in sufficient quantities, but only during the dry season. It cannot, however, be stored for more than one year, (in optimal conditions) due to infestation by termites, its brittleness and tendency to break with age. A more serious problem are the bush fires. Villagers must be informed about the necessity to restrict burning, at least until after sufficient amounts of the grass -- a perennial -- have been cut.

Rocks used in the construction of granaries are available throughout the region, but the quantities necessary to reconstruct granaries in all villages may require logistical support -- dump trucks or donkey carts (of which there are few in the project area) to help with transport.

E. System Retained for Building Construction

Due to the potential shortage of bamboo and the massive quantities which would be necessary for the reconstruction, compressed mud block is regarded as the best material for the task. It is both storable and transportable. Bamboo shall be reserved for roof construction and not used as the framework for wattle and daub.

Considering the limited time available for reconstruction, mud block is also the best material. On a small scale, wattle and daub houses can be raised more quickly, but mud blocks can be mass produced more rapidly than woven bamboo frames. Presses will be used for the fabrication of compressed mud blocks to make them quickly as well as to render them durable enough to transport.

1. Block Production

The production of building blocks by the use of a simple, manually operated block press can significantly reduce the amount of time required to fabricate the amount of blocks necessary for village reconstruction. Using traditional methods, two men can produce approximately 100 blocks per day. A block press can produce 500-600 blocks per day with a four man team. Block production can also be increased when presses are grouped together and organized into a factory-like system, where tasks are divided and individual operations become more systematic. Maximum efficiency depends upon the amount and type of logistical support (i.e. trucks, loaders, prepared borrow areas, mixers, etc.).

Unskilled laborers can be instructed in the operation of a block press with minimal training and supervision. For this reason, block presses are more desirable than more sophisticated automated presses which have faster production rates. Such equipment would necessitate more training and closer supervision and increase the possibilities of work accidents (manual presses are practically accident-free).

A typical block press consists of a mold box with pivoting cover plate, piston and pressure linkage which exert the necessary pressure to compress the earth mixture to form a block in the mold. The compressed block is ejected from the mold by releasing the toggle linkage and exerting pressure on the press handle. The three basic steps are filling the mold box, compressing the block, and ejecting the finished block. The finished block is left to dry in the open air, protected from the sun and rain so that water is eliminated slowly. The press is mounted on a heavy wood plank for stability. Other tools used in the block production are shovels for mixing, screening for sifting, and wheelbarrows for transport of materials.

2. Suitability and Testing of Soils

Not all soils can be used for house building. In order to select the best soils for brick making, prospective borrow areas should be identified. Simple soil tests can be performed on site or locally as indicated further below. Sampling is essential as the topography, vegetation, and groundwater can affect the local occurrence of suitable soils. Adjacent locations can possess completely different soil structures, making multiple borrow areas necessary.

Suitable soils should contain a good mixture of sand and clay, with some gravel. The gravel and sand serve as the body of the block and the clay as the particle binder. Organic materials should be completely avoided or removed, as they weaken cohesion in the block. Stabilizers such as Portland cement, lime or asphalt emulsions can be used to strengthen particle bonding, as their action reduces the natural tendency of clays to change volumes on contact with, or in the absence of water. Certain soils mixtures are found, however, which can be used without stabilizing additives provided that the recommended granulometry is respected. In general, soil that is used should be at least one-third sand, up to one-third clay/silt, and one-third gravel, (no greater than 6-10mm).

Simple soil tests which can be conducted in the field are the particle size analysis, compaction analysis, and shrinkage and moisture movement test.

1. The particle size or grading of a soil can be determined by finding the ratio of gravel to sand to clay/silt. The procedure involves a large jar filled halfway with the selected soil sample, and then filled with water to be shaken thoroughly and set aside for approximately 30 minutes. This allows the mixture to settle in layers with a larger particles on the bottom and finer ones on top. In this manner, the layers are measured. Then it can be decided if the sample is suitable or if the quantity of a certain particle size must be adjusted by adding more of another size.

2. The compaction analysis determines the cohesive ability of a soil mixture and its packing quality. This is largely determined by the clay content. The test is performed by taking a handful of the screened and slightly

moistened earth and squeezing it until the water content is reduced to a trace of moisture on the hand. The compacted ball is then dropped from a height of approximately three feet and examined on the ground as to how it has broken apart. The fewer the pieces indicates the better compacting ability of the soil.

3. The test for shrinkage and moisture movement is conducted in order to determine the need for a soil stabilizer and in what proportions, (if at all). A box of predetermined dimensions is filled with the soil sample and allowed to dry in or out of the sun for three to seven days. As the sample dries, the shrinkage is measured. A suitable soil should not exceed a certain limit of shrinkage and a corresponding high percentage of clay.

Excavation of earth for road construction and backfill for the dam construction have already identified extensive areas of lateritic soils. Laterites are defined as highly-weathered, clay-bearing materials with greatly varying proportions of iron and aluminum oxides, as well as quartz and other materials. These tropical soils range from a soft, unconsolidated consistency to a rock-like occurrence. The softer varieties are known for their ability to resist moisture and tendency to harden upon exposure to air. Lateritic soils contain very stable kaolinite clays making it possible to fabricate compressed blocks without the use of a stabilizer. These clay-stabilized soils may be exploited in the block production, thus eliminating the need for additional stabilizers.

F. Cost of Materials for Village Reconstruction (\$1 = 750 MF)

The cost of materials will depend upon the quantities required, the quantities available, and the method of purchase. As sleeping quarters will be the first structures needed for newly arrived settlers, the first material requirements are for housing construction. The cost of these materials are based on direct purchase from source areas. Purchasing by contract would include overhead charges and is addressed separately in the section on Contracting Options.

1. Roofing Materials

With the mobilization of the dam construction site and building of worker housing, bamboo and thatch prices have increased over the past year. Prices also vary between the seasons, being less expensive during the dry season when straw is abundant and villagers have more free time for collection, then during the rainy season when they devote their energy to farming. Prices for thatch and bamboo are as follows:

	<u>November 1982</u>	<u>April 1983</u>	<u>Projected 1984 Price</u>
. Straw (per stack)	150 FM	250 FM	300 FM (\$ 0.40)
. Straw (per bundle) \$	600 FM	1000 FM	1200 FM (\$ 1.60)
. Bamboo (per pole)	75 FM	100 FM	150 FM (\$ 0.20)
. Fiber for frames (estimated)	100 FM	125 FM	150 FM (\$ 0.20)

\$ 4 stacks = 1 bundle

2. Compressed Earth Blocks

Determining a fixed price for an ordinary banco block at Manantali is difficult, because either traditional standard housing has been built by villagers themselves to rent to dam workers, or else workers have acquired parcels of land and built for themselves. In order to calculate the cost of a compressed earth block, the following elements must be taken into consideration:

<u>Item</u>	<u>Projected 1984 Cost</u>
. Block Press and Tools (wheelbarrow, shovel, screen per press)	500,000 FM (locally available)
. Transport of Dirt	500 FM/m ³ /km
. Laborers	2,000 FM/day or per 500 blocks produced per day/4 laborers
. Supervision	8,000 FM/day, or per 2000 blocks supervised per day/1 supervisor

As the first priority with respect to village construction is to build houses, the cost of a block is based on this. In order to build 4,500 houses with 600 blocks per house, 2,700,000 blocks are needed. One cubic meter of dirt can make 100 blocks (dimensions 10 X 15 X 30) and 4 laborers working together on one press can produce an average of 500 blocks per day.

100 blocks = 1 m³ of dirt
500 blocks/day/4 laborers

<u>Item</u>	<u>Quantity</u>	<u>Unit price</u>	<u>Total FM</u>
Block Press	50	500,000 FM	25,000,000 FM
Dirt w/Transport	26,530 m ³ / for 5 kms	500 FM/km	66,345,000 FM
Laborers	5,307 days 500 b/day	2,000 FM/day	42,456,000 FM
Supervision	4 lab/500b 1,327 days 1 sup/2000b	8,000 FM/day	10,615,200 FM
TOTAL COST			144,416,200 FM = \$192,555,00
1984 Approximate Total Cost/Block			53 FM = \$0.07

3. Wood Beams and Planks for Doors

If wood beams and planks are purchased in quantity from the contractor responsible for clearing wood from the reservoir limit, prices can be estimated as follows:

Beams for granaries at 2.5 - 3.0 meter lengths: 500 FM/meter or
1500 FM/beam = \$2.00/beam

Planks for doors (depending on width): 1000 FM/meter
4.5 m (10 cm width) = 1 house door; 4500 FM or \$6.00 plus \$2.00 labor
= \$8.00

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3.0 (10 cm width) = 1 granary door; 3000 FM or \$4.00 plus \$2.00 labor
\$6.00

Wood beam could also be retrieved from the field clearing activities, in which case, the price would depend upon the labor necessary to transport the wood to the village sites.

4. Stones for Granaries

The quantity of stones necessary to reconstruct all granaries surpasses the amount naturally available around a typical village site, except in the cases where resettlement sites are near mountainous zones. In cases where stones are not locally available in sufficient quantity (i.e. river valley area of Zone 1), trucks may have to be used to transport the required quantities.

1 cubic meter of rock costs approximately 3,500 FM = \$4.65

G. Cost and Availability of Labor

During site visits and interviews, villagers were asked about their ability to furnish the labor and expertise necessary to rebuild their villages. In all cases the villagers expressed their interest and willingness to supply the necessary labor for the construction. Construction is uniquely the domain of men so the largest part of this task would fall upon them. Women usually assist in transporting of water and banco mortar, plastering walls and floors. Traditionally, work groups of youth, with women included, are employed when large tasks have to be done (i.e. communal field work, land clearing, road repair, etc.). This approach could be used in the reconstruction activities as well. Little expertise exists, however, in building construction other than for traditional mud houses. Above standard buildings are built by trained masons of which there are few in the project villages. Most men are capable, however, of building with mud blocks. Since men often build their houses and other structures in the concession, someone can usually be found in each concession with this type of building experience.

Villagers are not, however, used to building in a restricted amount of time or on such a large scale. New houses are built during the dry season at the leisure or pace desired by the owner. People do not fully comprehend the organization and time required to reconstruct an entire village.

Technical assistance will be required in block production and in the organization of the village construction site. Assistance in improved masonry techniques will increase building quality and most importantly, the villagers' ability to build efficiently.

An important project concern will be the availability of labor which will be affected by laborers seeking work at the dam site or in the deforestation project. Though the dam contractor has arrived at a quota of Malian workers allowed, the reservoir deforestation work may require many laborers. This might seriously deplete the village labor force if compensation is not available in the village reconstruction work.

It would be preferable to direct project monetary resources to the project population as much as possible. For example, as building materials have been promised to the villages, an effort can be made to buy necessary materials or hire required labor from resettling villages for project tasks requiring paid

labor (e.g. block making, house construction, well digging, field clearing). The villagers have a vested interest in accomplishing the successful resettlement of their villages and could be further encouraged and motivated by a just compensation for heavy tasks.

7.2.5.2 METHODS OF VILLAGE RECONSTRUCTION AND COST ANALYSIS

In order to arrive at a methodology for reconstruction activities several factors were considered, of which the principle concerns are discussed in this section. The expressed needs and desires of villagers, the constraints of the physical environment of the project area, and the dam construction schedule were all evaluated to determine the most appropriate and least-cost method for the resettlement.

One of the concerns of the villagers has been the selection and configuration of new village sites. The results of technical studies conducted in the resettlement zones were used to suggest new sites and determine infrastructure needs for water and access. These components were evaluated and a construction program established based on this analysis. The construction program is organized on the level of the individual village construction site. A projected sequence of tasks for reconstruction is presented as a guideline for implementation.

With the requirements for reconstruction defined, different options were studied concerning the approach to implementation and the potential contracting method. The cost analysis of the options looks at the advantages and disadvantages of each method.

A. Village Groupings and Resettlement Zones

The choice of new village sites has followed a detailed process and will be one of the first tasks to be finalized at the start of the project.

The 30 project villages (plus hamlets) have chosen to move to five resettlement zones (see Annex I in Section 7 for detailed plan). Two of these zones are located downstream from the dam: Zone No. I on the right bank near the existing village of Bingassi and Zone No. II on the left bank near the existing villages of Nantela and Sobela. The remaining three zones are located upstream from the dam near the boundaries of the future reservoir, all three on the right bank of the lake.

The logistics of transportation between the present villages and the resettlement area will play a very important role in the construction and moving processes. Distances vary between the existing villages and each of the five zones, from the shortest distance of 1 kilometer for a village in one zone to the longest distance of 53 kilometers for a village in another. The approximate distances between the present and future sites are shown in Annex I. In some cases these distances will vary according to the rapidity of road building or track upgrading and consequently the most direct access to village sites. The average distances that the villagers must travel between their present sites and resettlement areas are as follows: 38 and 22 kilometers, respectively for Zones I and II.

The significance of these distances logistically is that these villagers will not be able to travel daily to and from their new sites during the reconstruction process, but will have to spend extended periods of time there with visits back to their villages when necessary. The distances in the other zones are relatively short (6-8 kilometers) and thus pose less of a transport logistics problem.

B. Constraints on Reconstruction

The following areas could prove to be problematic in the implementation of construction activities if a strict schedule is not followed:

1. Geographical Situation

One of the fundamental determining factors in project design lies in the physical constraints posed by the geography of the Manantali area. The topography of the project area is characterized by two lines of sandstone cliffs at the edge of a regional plateau and hills, defining the limits of the Bafing River Valley. The dam reservoir will follow the 208 meter contour line which runs approximately along the base of the cliffs. Villages cannot remain in the river valley, nor move up the cliffs and are therefore forced to move downstream from the dam an average of 22 kms from their present sites. Few villages can actually remain in proximity to their present sites on the limits of the reservoir, due to natural restrictions of the terrain. The reservoir will cut off north-south circulation, as roads do not exist over the cliffs. The tracks which do exist behind the hills are quite distant from present and future village sites, thus requiring formidable detours if north-south circulation is to re-establish itself. Once the reservoir starts to fill, access between the different resettlement zones will become discontinuous and central control over activities physically fragmented. For this reason, all major construction activities must be well programmed taking into consideration these physical constraints of the project area.

2. Dam Construction Schedule

Construction on the Manantali Dam began with the first land clearing at the end of the rainy season in 1982. Though behind schedule at that time work shifts 24 hours a day brought the construction work up to date with the completion of the construction headquarters, the temporary bridge, the first diversion of the river, the concrete injections for the dam foundation, and equipment in place in November 1983. The effects of dam construction on village resettlement are:

. The third diversion of the river in the beginning of the rainy season 1986 will cause an abnormal rise of the river (three meters) which could cause the early flooding of five villages -- Soukoutali, Sékokoto, Kéniénéniéko, Dialakoto, and Souroufouga. The river will descend again during the dry season, but may remain abnormally high well into the dry season. Thus, these five villages should be safely moved by the 1986 rainy season. In addition, major streams off the right bank of the river could remain flooded into the subsequent dry season affecting parts of the road and jeopardizing continued access on the right bank of the river. This could require all villages moving from or to the right bank to be evacuated by the 1986 rainy season as well. This necessarily becomes Phase I of the resettlement.

. The reservoir is to start filling in rainy season of 1987. The remaining villages must be moved before the access roads are permanently cut off by dike construction and the eventual filling of the lake. This will be Phase II of the Resettlement.

Assuming that project mobilization takes place in early to mid 1984, construction activities can begin with the dry season at the end of 1984. As construction activities follow the dry seasons, this allows only three 9-months seasons in which to complete all major resettlement tasks.

3. Access Ways

With more than one half of the project villages moving to areas where means of access by vehicle is extremely poor, the establishment of adequate tracks to assure circulation during construction activities and thereafter is mandatory. Approximately ten villages in Zone I are to be located in areas where there has been no recent habitation. Some old fields are evident, but are not currently under cultivation. No roads exist in this area except for a track done by the well drilling team of the DNHE doing test wells and a very indirect access via the village of Bérétekounda to the north, which requires a detour of approximately 15 kms. The villages in Zone IV (Tintioulen) wish to locate in an area where fields are currently under cultivation and access is by means of a footpath. Village construction cannot begin in these areas before at least preliminary clearing of tracks to the new sites is accomplished. As both of these zones contain villages to be displaced during the first phase of resettlement work on access ways must begin there. The tracks to and between the existing villages will also require minimal maintenance at the end of each rainy season.

4. Water Availability

An important limitation to construction activities will be the availability of water. Water is not only necessary for the fabrication of blocks and house construction, but for the support of the village work crews to reside at the new sites. The villages to be moved during Phase I will be the first villages to receive functioning water points. A manual hand pump will be supplied for each of the 23 positive test wells to enable construction to begin. Well drilling must likewise start early in project activities, preferably in conjunction with final site selection since the location of exploitable water points will determine the final position of new villages (water points should be no more than 500 meters from the village site).

C. Reconstruction Policy

Following an evaluation of the several alternatives available-- building everything for villagers, providing only materials, providing a combination of material and technical assistance, or simply offering financial compensation -- the following policy has been adopted as most appropriate:

1. Construction of Houses (Sleeping Quarters)

The primary structure in a family concession is a house used for sleeping and the storage of personal and household items. All settlers must be assured adequate sleeping quarters upon arrival at the new villages. The project will pay to have the walls of these houses built by masons and laborers engaged and supervised by a construction contractor. The walls -- and all other structures will be rebuilt (granaries, chicken hutches, kitchens, livestock pens, etc.) using compressed but unstabilized mud block. Roofing materials will be supplied but members of the family concession, or village work groups, will be required to build the roofs.

Village inventories have indicated that houses vary between three distinct size categories, small, medium and large, with interior diameters ranging from 3.5 - 4 meters, 4.1 - 4.5 meters, and 4.6 - 5 meters. Sizes which fall within the small category will be reconstructed at 4 meters, those within medium at 4.5

meters, and those within large at 5 meters.

2. Provision of Building Materials for Construction of Supplementary Structures.

All buildings other than houses will be constructed by the villagers themselves at their own pace, with materials supplied by the project.

a. Granaries: Materials for granaries include mud blocks, bamboo, thatch, wood beams, and stones. Materials will be provided in quantities to allow for the construction of three distinct sizes: those inventoried with an interior diameter of 2.1 - 2.6 meters are considered small and will be supplied with materials to construct up to 2.6 meters; those of 2.7 - 3.2 meters are medium sized will be considered 3.2 meters; those which are 3.3 - 4 meters fall in the large category, to be considered 4 meters. The purpose of the categories is to expedite materials distribution, with an exact amount of materials corresponding to a size category.

b. Kitchens: Materials for kitchens include mud blocks, bamboo, and thatch. Materials will be supplied for 2 sizes of kitchen construction - small, between 3.4 - 3.8 meters, considered 3.8 meters; and large between 3.9 - 4.2 meters.

c. Chicken Hutches: These are all one size and will all receive the same amount of materials - mud blocks only.

d. Livestock Shelters: Materials will be provided to replace livestock shelters up to 4 meters, the largest average size inventoried. Materials include mud blocks, bamboo, and thatch.

e. Mosques: The two mosques located in the project area will require only blocks.

3. Reimbursement of Above Standard Private Village Owned Structures

Above standard houses built by villagers and the Protestant Mission facilities will be compensated for according to a price estimate based upon the type of construction and the unit cost. These buildings were measured and evaluated at a cost comparable to current prices, to allow for the reconstruction of a similar structure.

D. Organization of Village Construction Sites

A topographic map will be established of each new site. Contour lines will be shown at 5 meter intervals for a sufficiently large scale to identify productive trees to be saved, to study drainage, and to determine the amount of land to be cleared. The physical restraints of each site shall be studied and unfavorable areas avoided, such as zones with steep grades, hard lateritic crusts, low lying flood areas, etc.

Parceling of land is currently being designed by the Ministry of Public Works and the Institute of Cartography. The spatial organization of the former villages will be respected as closely as possible, observing the composition of each family concession and respecting neighbor and family affinities. A great deal of flexibility will be retained at the time of laying out of villages and subdivisions. The PMU will work with a topographer in the plotting of new villages.

The amount of land to be cleared and leveled is estimated at 50 m² per inhabitant plus an additional 20% to allow for extension in the future. An adequate amount of space must be planned for all physical structures, sitting areas, verandas and water areas within the concessions, gardens around the concessions, and public spaces in the village. The site will be cleared of brush, thicket and trees in the way of houses.

Moving of the villages might be carried out in two phases with the villages grouped as follows:

Phase I: To be moved by June 1986

Soukoutali	Dialakoto
Sékokoto	Kouroukondi
Kéniékéniéko	Bamafélé
Kéniéba	Konkorma
Nigui	Kourondi
Farabandi	Souroufouga

In addition to the five villages potentially threatened by the abnormal rise in water in 1986, the villages of Kiénéba, Nigui and Farabandi could be moved at the same time since they are moving downstream to Zone I and might encounter transport difficulties if the waters remain abnormally high throughout the following dry season. Konkorma and Kourondi could be moved as well since they will be grouped on the right bank of the reservoir along with the other villages of the Tintioulen zone, thus depending upon the right bank road for sure transportation. Bamafélé is included as it is the Administrative center of the area. Phase I is comprised of 12 villages.

Phase II: To be moved by June 1987.

Firia	Koniakaré
Madinandi/Sandégnan	Badioké
Tondidji	Samantoutou
Ganfan	Ougoudinko
Kambou	Diokéli
Tinntila	Bantandjoké
Barlakourou	Bambouta
Goumbalan	Goungoudala
Maréna	Diba

1. Sequence of Tasks for Village Reconstruction

The general sequence of activities suggested at the new sites is listed below. This describes the individual tasks and conditions necessary for each phase to be executed successfully. The two phases of resettlement will not be carried out as isolated programs, since many activities will coincide and prove to be interdependent (i.e; roads, wells, land clearing, etc.). These tasks are elaborated time-wise in a proposed implementation schedule shown in Figure III.

a) Preliminary Work

Results of Final Soils Study and Topographic Surveys: To be applied to preliminary sites chosen by the villages. Necessary adjustments or changes of sites carried out.

Supplementary Work necessary for any site changes executed (i.e. new topographic survey, etc.)

b) Final Site Selection and Preparation

Final Sites Visited and Approved by all Required Parties: Village representatives including spiritual leaders visit final sites with appropriate experts (Architect - Urbanist - Engineer), Authorities of the Administration (Chef d'Arrondissement), and representatives of the Resettlement Project.

Establish Plot Plans of New Villages Based on Plan of Former Villages: To be accomplished using aerial photographs to be furnished under UNDP financing and topographic surveys of former sites, also to be accomplished under the UNDP financing.

Village Input and Adjustment of Plans: Changes to the proposed plans as indicated by the villages allowing maximum flexibility for future changes during construction.

Designation of Construction Zones: To be carried out on the site to determine warehouse area, and parcels to be assigned to villagers based on the existing composition of each family concession in present village, respecting neighbor and family affinities.

Plotting of Village Plans on the Sites: Physical delimitation of new site and individual family parcels.

Site Clearing: Land leveling by use of heavy machinery, area estimated at 60 m²/inhabitant.

Layout of Concessions and Subdivision of Household Plots: Planting of stacks delimiting individual concessions, establishment of spurs and paths, public spaces, etc.

c) Establishment of Wells, Tracks, Warehouses

Well Drilling and Cistern Construction: Establishment of water source for construction needs and eventual village exploitation.

Construction of Zone Warehouses: Establishment of storage facilities for building materials and food aid.

Construction of Tracks: Preliminary tracing or simple grading of access spurs to villages to permit circulation. Beginning of track improvement program.

d) Fabrication and Collection of Materials

Establishment of Work Teams for Block Production and Delivery of Earth: Block factories set up at sites of pre-assigned villages with necessary materials to fabricate quota according to rotation schedule.

Collection of Materials: Collection of bamboo, thatch and wood to be carried out concurrently with block production.

e) Establishment of Construction Scheduling:

Establishment of Village Plan: Schedule of house construction to be carried out concession by concession.

Establishment of Transfer Calendar: Transportation schedule for village transfer.

f) Construction Activities:

Construction of Houses: Layouts within each household concession.

Construction of Public Infrastructure

Furnishing of Materials for Supplementary Buildings

g) Transport of People and Goods

h) Post-Transfer Activities

Construction of Supplementary Buildings: Materials furnished, construction to be carried out by villagers.

Finish Public Buildings

Finish Track Improvements

2. Scheduling of Construction Activities

The general organization of the construction program follows the geographic location of the five resettlement zones and the transfer of people over two years. For the most part villagers will be locally organized and coordinated, using common storage facilities and construction equipment. Each village, however, will retain its autonomy and independently control its own jobsite.

In order to establish a construction schedule, the following elements were considered:

- . material quantities needed
- . number of structures to be built
- . construction equipment necessary
- . workers necessary for different construction tasks
- . time necessary to carry out each construction task

As sleeping quarters are the first building priority, material quantities are listed per village in Table III, based on inventory data, and subtotaled according to village grouping. Quantities for granaries, kitchens, chicken huts, and livestock shelters are also estimated in Tables IV, V, VI and VII respectively. The number of sleeping quarters per grouping are also listed.

Apart from logistic support of dump trucks and loaders to deliver earth to the sites for blockmaking, block presses are the principle pieces of equipment needed on the jobsites, along with wheel barrows, shovels, screening, etc.

In the fabrication of mud blocks, presses set up in groups of four form the most efficient production system; one factory of four presses can produce an average of 2000 blocks/day. With four laborers per press and four presses per factory, a team of 16 laborers comprise the basic work unit. House building can also be accomplished efficiently with a team of three workers raising one house per day. This was observed during field visits and also reported as the formula for reconstruction at Selingue. With these basic formulas and a knowledge of the number of structures or materials needed, the time necessary to carry out different tasks can be estimated.

Tables VIII and IX give a general idea how the time required for house construction can be estimated, for Phase I and Phase II respectively. The first assumption is that blocks will be produced the same season that structures are built and the village moved. The next assumption is that construction will take place during the nine month dry period, thus limiting the amount of time available to make blocks and raise houses before the rains set in. The time estimates in Tables VIII and IX have been calculated without overlapping tasks in order to demonstrate the maximum amount of time which would be required to accomplish the wall work of houses. The approach most likely to be used, however, will be to build simultaneously as soon as blocks are available. The assembling of roofs, which takes approximately four men 2 days to finish, would also be set up in teams working simultaneously with the blockmakers and housebuilders, in somewhat like an assembly line production.

The basic material needs for the 12 villages of Phase I is estimated at 1,865 houses requiring 1,119,000 compressed mud blocks, 149,000 bamboo poles, and 22,800 bundles of thatch. In addition, the material needs for supplementary structures is estimated at 502,400 blocks, for a total of 1,621,400; 70,720 bamboo poles, for a total of 219,720; and 9,620 bundles of thatch, for a total of 32,720 bundles. With a usual mix of 8 presses it would take on the average 85 days, or a little over three months (§) to fabricate all the bricks necessary for the reconstruction of the average Phase I village grouping. With an average of four building teams per grouping, it would take an average of 81 days or three months (§) to raise the walls of the houses. It would take the roof workers twice that time to finish all the roofs, so either their numbers would be increased, or adequate logistical support would have to be assured to avoid any lapses in the materials supply. These time estimates also include a 30% increase to allow for any unforeseen difficulties which might arise.

The estimated material needs for the 18 villages of Phase II include 2,558 houses, requiring 1,535,000 mud blocks, 205,200 bamboo poles and 31,200 bundles of thatch. The totals for houses and supplementary structures are 2,408,650 blocks; 331,450 bamboo poles, and 48,238 bundles of thatch.

The need for 50 presses in Phase I increases to 60 presses in Phase II. Normally, if construction progresses according to schedule, as soon as Phase I finishes with their presses, these would rotate on to Phase II. Phase II villages could already begin block production during Phase I and store the pressed blocks

§ Working months are calculated as having 26 days, with four days for rest.

in the zone warehouse, or under a well protected shelter. Another possibility is to purchase another 10 presses for the assurance that no village is delayed due to lack of presses.

Two safety factors have been included in this type of construction schedule. First, calculations have been made considering that all materials can be furnished to a particular village during an allotted period of time and that each village will adhere to a semi-imposed program. If, however, for any reasons construction falls behind schedule, the production and furnishing of materials for the supplementary structures can be left to a future date, if need be after the villages have moved. In this manner, the structures of primary importance sleeping quarters, will definitely be terminated according to a planned schedule to assure all villagers adequate shelter at the new sites, and supplementary structures will be completed as the provision of building materials can be programmed at the convenience of the project.

The second safety factor is that construction could be continued into the rainy season. The greatest obstacle of the rainy season is the deterioration of access tracks and intermittent flooding of streams, hindering all transportation, following storms. The storms, however, tend to be short-lived, with periods of sunshine between storms to allow the ground to dry up. If complications arise and construction falls behind schedule, blockmaking could continue into the rainy season providing that materials (earth) are stockpiled at the sites beforehand, thus allowing the villagers to work during the intermittent periods of sunshine. In case of Zone I, located off the improved Mahina-Manantali road, trucks could even supply the sites during the rainy season. A lack of labor could be the only problem if the villagers are working either their former or new fields. On the other hand, if they are on food aid and the labor is paid, villagers could very well choose to work on the village site. To the contrary, if village labor is not available, depending upon the urgency of the situation, outside labor could be easily secured in the Manantali area.

E. Contracting Options and Cost Analysis

In order to determine the most appropriate, expeditious and cost effective approach to accomplishing the village reconstruction task, the following options for implementation were considered:

1. Use of a Local Construction Firm,
2. Use of a Local Jobber (Tâcheron),
3. Intervention of specialized NGO or PVO,
4. Intervention of the RPU,
5. Village Administered.

The advantages and disadvantages of each option are as follows:

1. The use of a local private construction firm has the advantage of rapidity and a defined standard of quality. It is always in the interest of construction contractors to perform work in the shortest amount of time possible in order to maximize profits. This approach would also require the least amount of intervention of the PMU and USAID, as the task of supervisor and quality control would be contracted out as well. This approach also would be the most costly due to mobilization and overhead charges and the large margin of profit anticipated.

Other disadvantages to this approach lie in the lack of spontaneity and flexibility in implementation. Village participation in construction would be minimal. Precise plans locating all houses to be built would be required for all village sites, according to standard construction practices, before execution of the work.

2. The use of a local private jobber has the advantage of rapidity, though not to the extent of a large construction firm, and of construction of a defined standard of quality. Local jobbers are generally small construction firms which subcontract work from larger firms. Their capacity material-wise is inferior to the larger firms, and would therefore require more time to execute a task. Their advantage over large firms are lower overhead fees, lower profit margins, and more flexibility in execution. It would be feasible with smaller firms to include the villagers more directly in the construction process as they quite often hire workers locally and are more apt to accept unusual conditions (i.e. use and train villagers exclusively for their labor force) in the interest of securing a contract. There would also be more flexibility in the requirement of precise plans for execution of the work, as their construction practices tend to be less formal. The disadvantage of these small firms is that one would not be able to undertake the entire reconstruction task. The work would have to be divided between two or more jobbers, and by phase. The work would be supervised by a separate contract, but in total would require more intervention of the RPU. The cost would still be relatively high, but lower than if by a large construction firm.

3. The intervention of a specialized non-governmental organization or a private voluntary organization has the advantage of expertise in specific areas and no profit motive due to the benevolent nature of their work. In this case an organization specialized in construction and self-help work would be sought. The cost of this approach would reflect the true cost of the actual construction work along with the cost of supporting the technical assistance and operating expenses. Execution by this method would assure maximum village participation, flexibility and spontaneity in the construction process, and a minimal management burden on the RPU. Contracting and accounting procedures would also be simplified. Implementation schedules and technical plans would be developed with the RPU in conjunction with the villages. The disadvantage of this approach is that there are few organizations involved in this type of work or specialized in this type of construction. A PVO would have to field a staff with the necessary expertise, which could be time consuming and risky. Local Malian PVO's are little developed and NGO's small and relatively inexperienced.

4. The intervention of the Resettlement Project Unit would have the advantage of complete control over project activities, from planning and coordination, to execution. The RPU would hire all necessary personnel, organize the construction activities and supervise the execution of the work. Costs would be minimum, covering the cost of materials, labor, transport and related operating expenses. Technical assistance would already be covered under the operating expenses for the project staff. The management burden, however, would prove to be enormous and the most cumbersome of all the contracting approaches. Another disadvantage would lie in logistical coordination, as the RPU will not have the heavy equipment necessary to perform the work and would be required to rent it from whatever source available. This approach could be very time consuming and inefficient.

5. Village administered construction would have the advantage of complete control of reconstruction activities by the settlers themselves. Villagers

would collect materials, fabricate blocks, and build their new villages as they wish, at their own rate. This would be the most spontaneous and villager oriented approach, as well as the least costly. The disadvantages lie in the lack of time; the great distances between the former and new village sites, and the villager's inexperience with large scale construction.

A cost analysis of the different contracting options is shown in Table X. Village reconstruction is divided into two parts; the construction of houses, and the provision of materials for supplementary structures. The costs for house construction are based upon unit prices calculated according to the square meter. Each unit price is based upon the true cost for construction with a certain percentage added according to the method of contracting used. The standard house used has an interior diameter of 4.5 meters or a unit area of 16 m². The base cost of a standard house is estimated at \$104.00, for materials, labor and no technical assistance. Each option has been evaluated according to the degree of technical assistance needed, operating expenses involved and the profit margin where applicable.

The provision of materials has been calculated according to the quantities and costs of the materials themselves, and transport and overhead fees where applicable. Material quantities for the supplementary structures are taken from Tables IV- VII. Costs are taken from the section on Cost of Materials for Village Reconstruction.

Option Recommended

Option 1, use a local construction firm, is eliminated due to its high cost and little assurance of village participation in the construction process.

Option 4, intervention of the RPU, is eliminated due to the extreme management burden posed upon the RPU and the uncertainty whether there would be enough time to complete the work, without jeopardizing the other functions of the unit.

Option 5, village administered construction, is eliminated as it is unrealistic time-wise and logistically for villagers to build new houses and collect and fabricate materials without any assistance whatsoever.

Option 2, is considered a viable approach to village reconstruction if the time factor is of major importance.

Option 3, however, is considered the most appropriate option if methodology of village construction and village participation are of major importance.

The choice of either option will depend upon the date of project approval and the signing of the PROAG and the availability of qualified construction firms or specialized organizations.

Further research into Option 3 has uncovered an organization capable of executing the reconstruction work, currently being installed in Mali. ADAUA, the Association for the Development of a Traditional African Urbanism and Architecture, is an international non-profit organization based in Ouagadougou, Upper Volta. Originally working out of Geneva, Switzerland, it was created in the early 1970's and gradually turned its focus to West Africa in the interest of promoting the use of indigenous building materials and improved construction methods appropriate to the African milieu. ADAUA has primarily concentrated on the construction low-cost housing and the creation of in-country capacity in the form of cooperatives and training programs to execute the construction programs. They work in conjunction with an extensive research program on local building materials, in an effort

to reduce the current dependence upon expensive imported products.

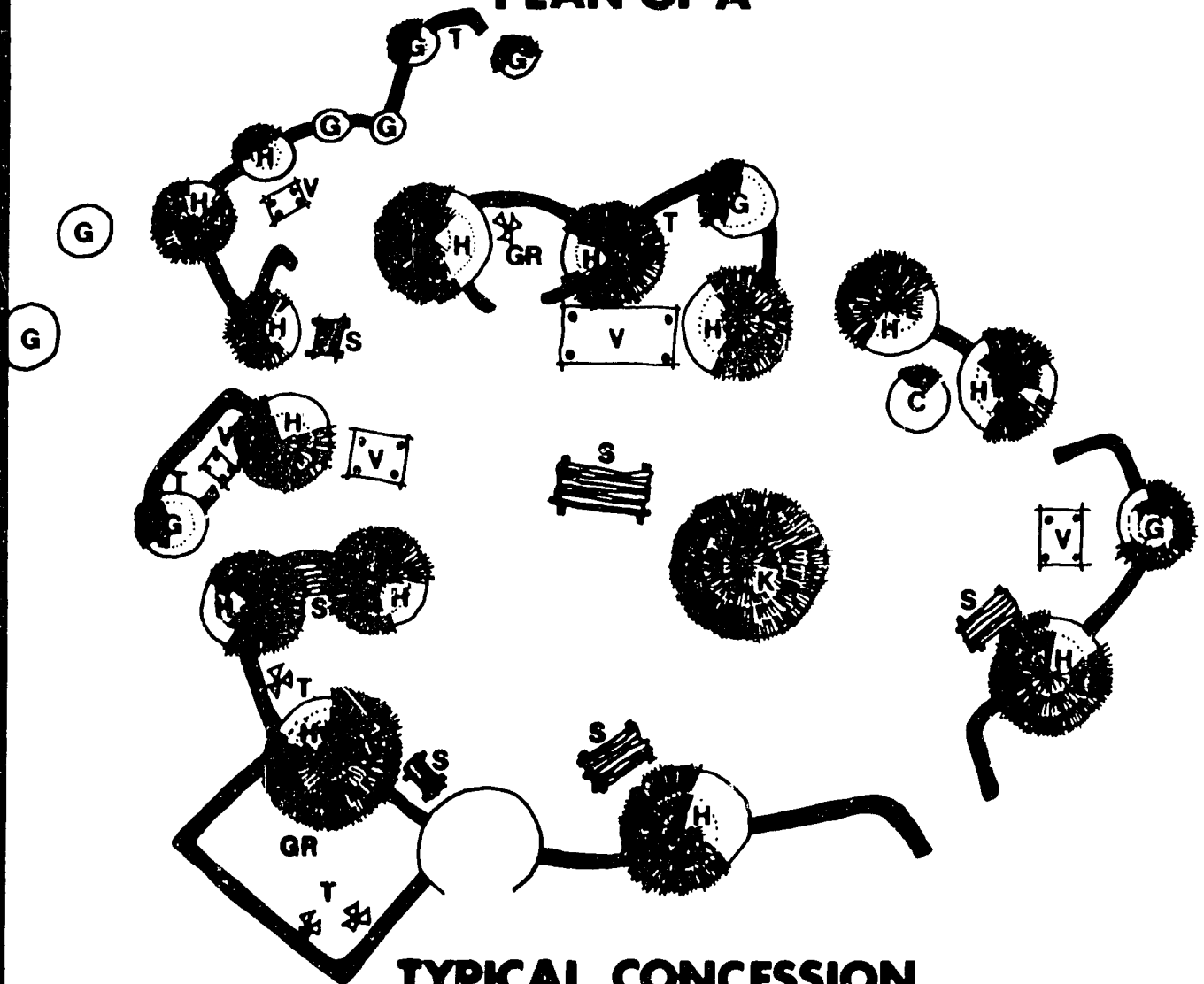
ADAUA has just recently installed a headquarters in Mali and will be involved in two projects initially over the next couple of years. The first is in conjunction with the Directorate of Urbanism to transfer their appropriate technology to the Republic of Mali by training masons and technicians in the construction of 24 pilot housing units in a suburb of Bamako. By establishing this local capacity, Malians will be able to continue with the sensibilization process in their country. The second project, financed by the World Bank, is part of a health program in the First Region of Mali, in which ADAUA will be training local masons and technicians and forming self-supporting cooperatives in the construction of rural health centers.

ADAUA has been unofficially contacted by AID but has not been officially solicited for an expression of interest. Due to the uncertainty of their availability, Option 2 has been retained for budgetary purposes, as it is the most realistic alternative to Option 3. The cost of this option (seen in Table X) is estimated at \$2,187,388.00.

MANANTALI RESETTLEMENT

FIGURE I

PLAN OF A



TYPICAL CONCESSION

- H HOUSE (SLEEPING QUARTERS) / CASE D'HABITATION
- G GRANARY / GRENIER
- K KITCHEN / CUISINE
- C CHICKEN HOUSE / POULAILLER
- V VERANDA / VERANDA
- T TOILET-SHOWER / TOILETTE - DOUCHE
- GR GARDEN / JARDIN
- S SEAT / SIEGE

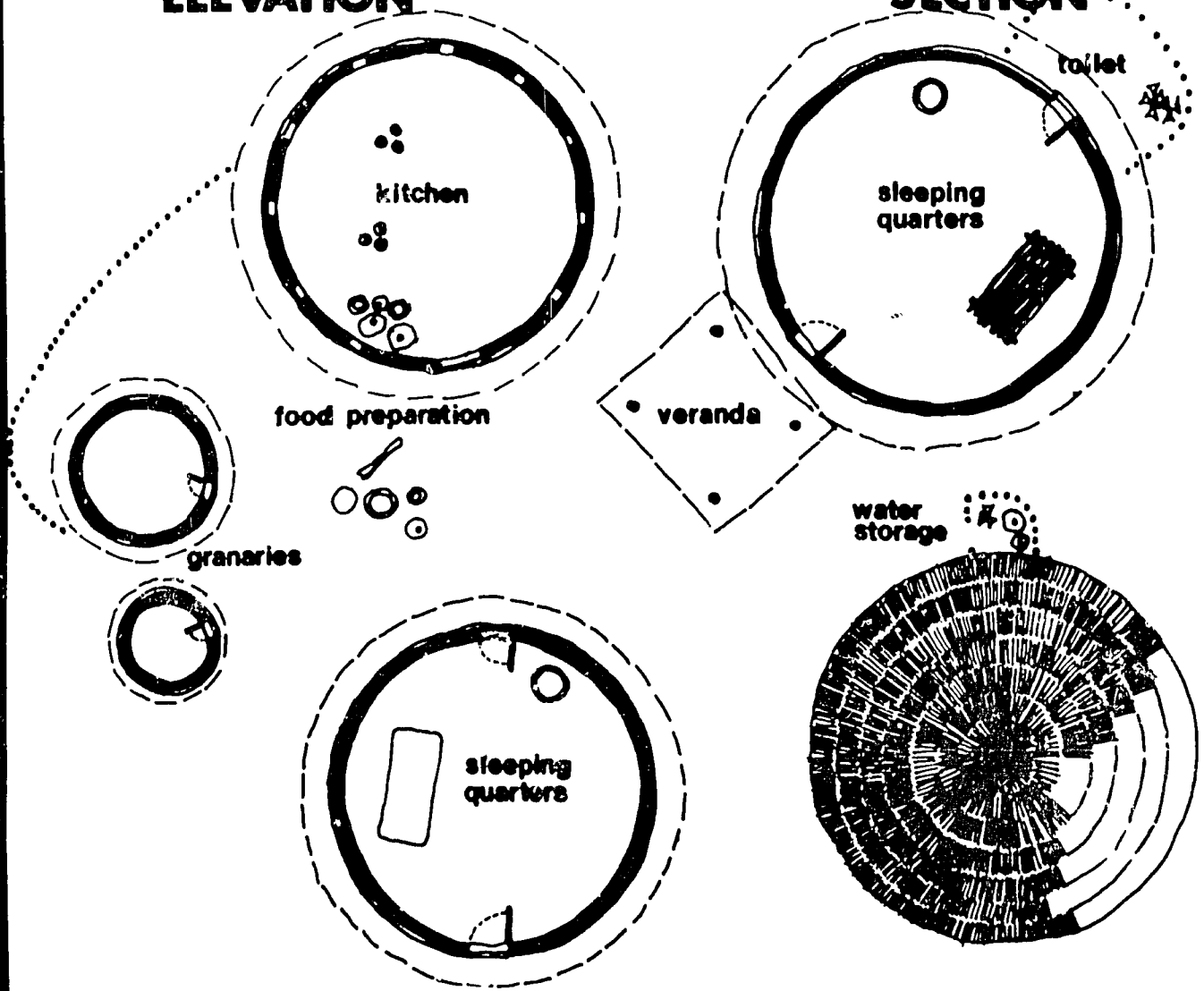
FIGURE II

MANANTALI RESETTLEMENT



ELEVATION

SECTION



0 1 5 10 meters

PLAN OF A HOUSEHOLD

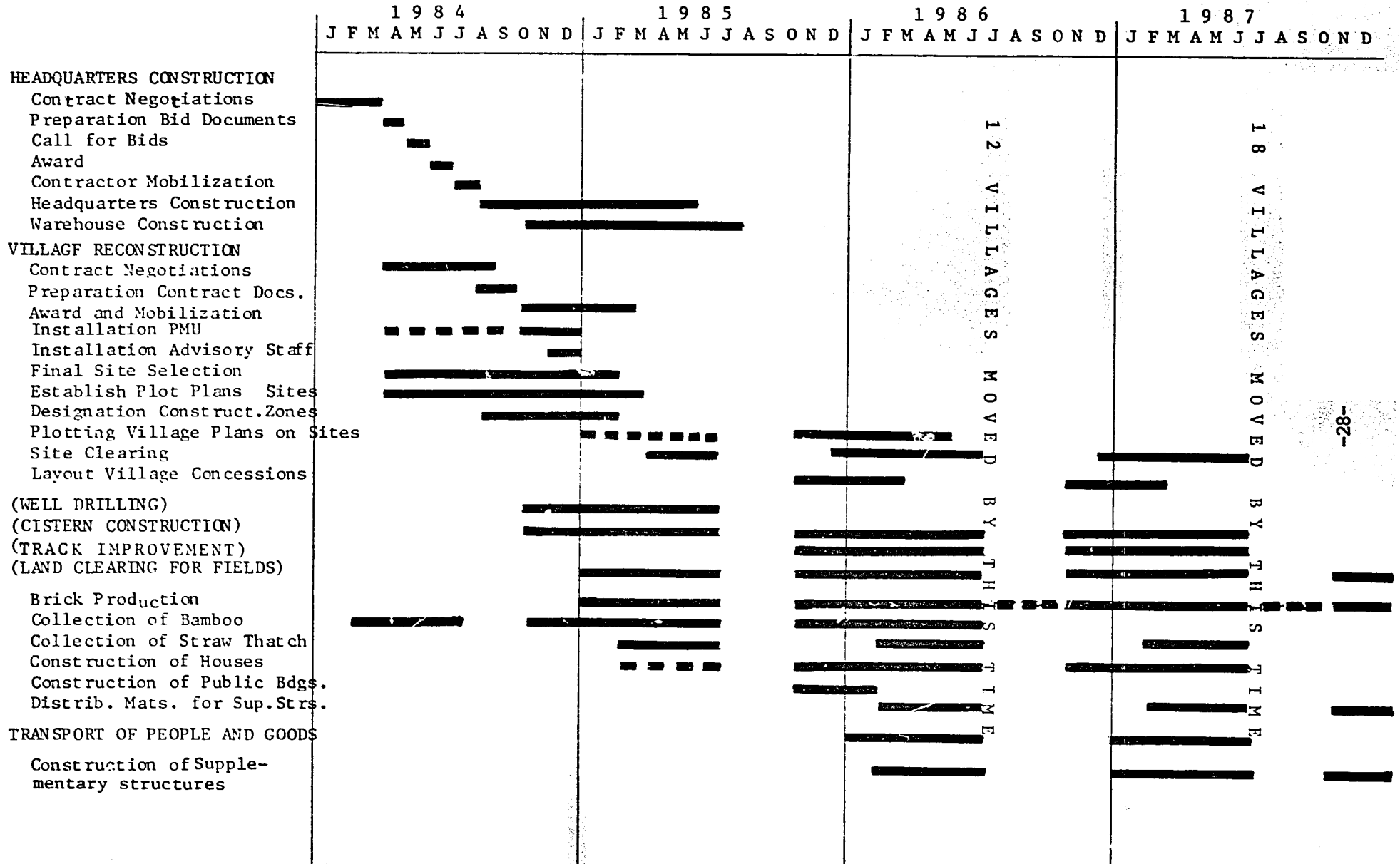
SMB
600/ENGR

1977

FIGURE III

October 1983

PROPOSED IMPLEMENTATION PLAN FOR VILLAGE RECONSTRUCTION



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TABLE 1

INVENTORY OF PHYSICAL STRUCTURES PRESENTLY EXISTING IN PROJECT VILLAGES

Village	Type of Structure	Average Interior Diameter(m)	Average Wall Height(m)	No. of Bamboo Poles	No. of Stacks of Straw	No. of Structures			Total No. of Structures	Percentage of total village structures
						Sm	Med	Lg		
1. Soukoutali (w/Dougoutakoto and Liliko)	House	4.2	1.8	60	12	92	121	24	237	68
	Granary	3.2	1.5	40	8	4	15	54	73	21
	Kitchen	3.4	1.5	45	8				6	2
	Chicken	1.7	.5	§	§				23	7
	Livestock	3.6	1.4	45	9				9	2
								348		
2. Sékokoto	House	4.4	1.8	70	10	14	41	3	58	62
	Granary	3.4	1.4	55	7	1	7	15	23	25
	Kitchen	3.8	1.7	60	8				3	3
	Chicken	1.8	.5	§	§				7	8
	Livestock	3.6	1.4	60	8				2	2
								93		
3. Kēniēkēniēko	House	4.5	1.8	80	10				216	53
	Granary	3.5	1.4	60	8				108	27
	Kitchen	4.0	1.6	65	8				30	7
	Chicken	1.8	.5	§	§				32	8
	Livestock	3.8	1.4	60	8				21	5
								407		
4. Nigui	House	4.2	1.8	80	14	49	79	9	137	55
	Granary	3.2	1.5	60	10	10	23	23	56	22
	Kitchen	3.6	1.7	65	10				28	11
	Chicken	1.8	.6	§	§				24	10
	Livestock	3.5	1.4	60	8				5	2
								250		
5. Farabandi	House	4.3	1.8	80	14	17	155	23	195	56
	Granary	3.2	1.4	55	8	5	36	61	102	29
	Kitchen	3.7	1.5	65	10				13	4
	Chicken	1.6	.7	§	§				27	8
	Livestock	3.6	1.4	60	8				9	3
								846		

§ Chicken huts have stick and mud roof

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TABLE 1 (cont.)

Village	Type of Structure	Average Interior Diameter(m)	Average Wall Height(m)	No. of Bamboo Poles	No. of Stacks of Straw	No. of Structures			Total No. of Structures	Percentage of total Village Structures
						Sm	Med	Lg		
6. Kēniēba	House	4.5	1.8	70	10	42	183	33	258	58
	Granary	3.5	1.4	60	8	28	77	23	128	29
	Kitchen	4.0	1.5	65	8				24	5
	Chicken	1.6	.7	5	5				27	6
	Livestock	4.0	1.5	60	7				11	2
								448		
7. Madinandi	House	4.5	1.9	70	12	27	70	21	118	49
	Granary	3.6	1.4	50	8	27	32	25	84	35
	Kitchen	3.8	1.6	55	8				14	6
	Chicken	1.8	.5	5	5				19	7
	Livestock	3.4	1.3	50	6				7	3
								242		
8. Firia	House	4.5	1.9	70	12	31	118	20	169	55
	Granary	3.5	1.6	55	8	25	48	14	87	29
	Kitchen	4.0	1.5	60	10				10	3
	Chicken	1.8	.5	5	5				26	9
	Livestock	3.8	1.4	50	8				13	4
								305		
9. Tondidji	House	4.5	1.9	80	16	27	115	35	177	53
	Granary	3.6	1.6	60	10	4	26	94	124	37
	Kitchen	3.8	1.7	65	10				11	3
	Chicken	1.5	.5	5	5				19	6
	Livestock	3.4	1.4	50	8				3	1
								334		
10. Ganfan	House	4.5	1.8	70	14	5	75	33	113	50
	Granary	3.2	1.4	50	6	7	38	24	69	31
	Kitchen	3.8	1.6	60	10				14	6
	Chicken	1.5	.7	5	5				20	9
	Livestock	3.5	1.4	50	8				9	4
								225		
11. Kambou	House	4.3	1.8	70	14	8	25	8	41	42
	Granary	3.8	1.5	60	12				44	46
	Kitchen	3.8	1.6	60	10	1	9	34	4	4
	Chicken	1.6	.7	5	5				6	6
	Livestock	3.2	1.4	40	6				2	2
								97		

25C

TABLE 1 (cont.)

Village	Type of Structure	Average Interior Diameter (m)	Average Wall Height (m)	No. of Bamboo Poles	No. of Stacks of Straw	No. of Structures			Total No. of Struct.	Percentage of Total Village Structures	Observ.
						Sm	Med	Lg			
12. Dialakoto	House	4.2	1.7	60	9	21	25	3	49	56	Avg. door: .6 x 1.5 Avg. door: .55 x 1.0
	Granary	3.1	1.4	45	6	16	9	1	26	30	
	Kitchen	4.0	1.5	55	9	0	2	0	2	2	
	Chicken	1.6	.5	5	5				9	10	
	Livestock	3.5	1.4	45	7				2	2	
									88		
13. Souroufouga	House	4.3	1.8	55	8	12	8	6	26	46	Avg. door: .56 x 1.35 Avg. door: .50 x .87
	Granary	3.1	1.3	35	5	13	6	1	20	36	
	Kitchen	3.7	1.6	45	6				3	5	
	Chicken	1.7	.7	5	5				3	5	
	Livestock	3.5	1.3	30	4				4	8	
									56		
14. Kouroukondi	House	4.4	1.7	70	12	32	49	24	105	52	Avg. door: .60 x 1.40 Avg. door: .50 x .90
	Granary	3.6	1.5	50	6	9	27	30	66	33	
	Kitchen	4.3	1.6	60	8				14	7	
	Chicken	1.5	.7	5	5				14	7	
	Livestock	3.5	1.3	60	8				3	1	
									202		
15. Barlakourou	House	4.4	1.7	70	12	15	57	9	81	49	Avg. door: .65 x 1.50 Avg. door: .50 x .90
	Granary	3.3	1.4	45	4	22	22	8	52	32	
	Kitchen	3.9	1.6	55	8				13	8	
	Chicken	1.5	.5	5	5				15	9	
	Livestock	3.4	1.4	45	4				4	2	
									165		
16. Tinntila	House	4.5	1.8	80	10	18	90	22	130	50	Avg. door: .65 x 1.40 Avg. door: .50 x .92
	Granary	3.4	1.4	50	6	15	56	18	89	34	
	Kitchen	3.2	1.6	50	6				14	5	
	Chicken	2.0	.8						22	8	
	Livestock								7	3	
									162		

TABLE 1 (cont.)

Village	Type of Structure	Average Interior Diameter (m)	Average Wall Height (m)	No. of Bamboo Poles	No. of Stacks of Straw	No. of Structures			Total No. of Struct.	Percentage of Total Village Structures
						Sm	Med	Lg		
17. Bamafélé	House	4.5	1.8	60	12	23	148	71	242	55
	Granary	3.6	1.5	50	8	3	56	59	118	27
	Kitchen	4.2	1.6	50	10				28	6
	Chicken	1.9	.7	5	5				38	8
	Livestock	3.5	1.5	40	8				17	34
								443		
18. Goumbalan	House	4.2	1.7	65	9	37	59	2	98	51
	Granary	3.0	1.5	55	6	4	14	48	66	35
	Kitchen	3.8	1.6	60	8				10	5
	Chicken	1.5	.6	5	5				10	5
	Livestock	4.0	1.3	55	6				7	4
								191		
19. Konialaré	House	4.5	1.8	60	10	16	34	2	52	55
	Granary	3.2	1.6	50	6	4	12	12	28	30
	Kitchen	3.6	1.6	55	8				4	4
	Chicken	1.6	.6	5	5				5	5
	Livestock	4.0	1.6	60	10				6	6
								95		
20. Maréna	House	4.4	1.8	70	14	62	156	11	229	57
	Granary	3.4	1.6	60	8	5	29	82	116	29
	Kitchen	3.8	1.6	65	10				16	4
	Chicken	1.6	.5	5	5				28	7
	Livestock	3.6		50	8				13	3
								402		
21. Badioké	House	4.4	1.9	70	16	7	78	36	121	47
	Granary	3.2	1.7	60	10	3	25	66	94	37
	Kitchen	3.6	1.5	60	12				8	3
	Chicken	1.8	.7	5	5				12	5
	Livestock	3.5	1.5	55	10				20	8
								255		
22. Konkorma	Houses	4.4	1.7	80	14	23	98	27	148	51
	Granary	3.4	1.4	60	8	14	32	42	88	31
	Kitchen	3.5	1.6	60	8				17	6
	Chicken	1.6	.6	5	5				26	9
	Livestock	3.2	1.3		6				9	3
								288		

TABLE II
TOTAL QUANTITIES OF PHYSICAL STRUCTURES INVENTORIED

	<u>Village</u>	<u>Population§</u>	<u>No. of Concessions</u>	<u>No. of Houses</u>	<u>No. of Granaries</u>	<u>No. of Kitchens</u>	<u>No. of Chicken Huts</u>	<u>No. of Live-stock shelters</u>
1.	Soukoutali w/2 hamlets	325	26	237	73	6	23	9
2.	Sékokoto	110	8	58	23	3	7	2
3.	Kéniékéniéko	445	36	216	108	30	32	21
4.	Nigui	294	19	137	56	28	24	5
5.	Farabandi	400	14	195	102	13	27	9
6.	Kéniéba	479	35	258	128	24	27	11
7.	Madinandi	227	16	118	84	14	19	7
8.	Firia	360	30	169	87	10	26	13
9.	Tonididji	350	12	177	124	11	19	3
10.	Ganfan	212	20	113	69	14	20	9
11.	Kambou	83	5	41	44	4	6	2
12.	Dialakoto	102	8	49	26	2	9	2
13.	Souroufouga	62	3	26	20	3	3	4
14.	Kouroukondi	204	16	105	66	14	14	3
15.	Barlakourou	237	17	81	52	13	15	4
16.	Tinntila	251	15	130	89	14	22	7
17.	Konkorma	299	27	148	88	17	26	9
18.	Bamafélé	573	43	242	118	28	38	17
19.	Goumbalan	257	5	98	66	10	10	7
20.	Koniakaré	130	3	52	28	4	5	6
21.	Maréna	467	26	229	116	16	28	13
22.	Badioké	274	16	121	94	8	12	20
	§§ w/3 hamlets	59		30	20	3	4	2
	§§ w/2 hamlets of Kambou	90		45	50	5	6	3
23.	§§ Samantoutou	68		34	21	4	5	2

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TABLE II (cont.)

	Village	Population§	No. of Concessions	No. of Houses	No. of Granaries	No. of Kitchens	No. of Chicken huts	No. of Live-stock shelters
24.	Bantandjoké §§ w/1 hamlet	178		89	62	9	13	6
25.	§§ Diokéli w/4 hamlets	402		205	140	20	28	12
26.	§§ Ougoudinko w/1 hamlet	433		216	151	22	31	13
27.	§§ Kouroundi	50		25	18	3	4	2
28.	§§ Bambouta	229		115	80	12	16	7
29.	§§ Goungoudala w/1 hamlet	297		149	104	15	21	9
30.	§§ Diba	234		117	82	12	16	7
SUB TOTALS		8,181		4,021	2,392	391	556	246
Plus 10% Margin of Error: (20% for Granaries)		<u>818</u>		<u>402</u>	<u>478</u>	<u>39</u>	<u>56</u>	<u>25</u>
Rounded to:		9,000		4,423	2,870	430	612	271
Rounded to:		9,000		4,500	3,000	450	650	300

§ Population figures taken from 1983 IER Study.

§§ Villages where inventories were not conducted, but estimates were made according to population figures and building statistics.

TABLE III
ESTIMATE OF BUILDING MATERIAL QUANTITIES FOR HOUSE CONSTRUCTION *

<u>Resettlement Site</u>	<u>Village Grouping & Hamlets(H)</u>	<u>No. of Bricks</u>	<u>No. of Bamboos</u>	<u>No. of Straw Bun.</u>	<u>Total Bricks Grouping</u>	<u>Total Bamboos Grouping</u>	<u>Total Straw Group.</u>
<u>ZONE No. 1 - DOWNSTREAM/RIGHT BANK</u>							
1. Bingassi I	Bamafélé	160,000	21,300	3,200	160,000	21,300	3,200
2. Bingassi II	Samantoutou	23,000	3,000	500	82,000	10,800	1,700
	Bantandjoké & H.	59,000	7,800	1,200			
3. Faradala	Diokéli & H.	132,000	18,000	2,700	274,000	37,000	5,600
	Ougoudinko & H.	142,000	19,000	2,900			
4. Mintégnan	Kéniéba	170,000	22,600	3,400	170,000	22,600	3,400
5. Dékélikourou I	Nigui	90,000	12,000	1,800	219,000	29,100	4,400
	Farabandi	129,000	17,100	2,600			
6. Dékélikourou II	Soukoutali & H.	156,000	20,900	3,200	194,000	26,000	4,000
	Sékokoto	38,000	5,100	800			
7. Dalafara	Kéniékéniéko	143,000	18,900	2,900	160,000	21,200	3,300
	Souroufouga	17,000	2,300	400			
8. Kolonindala	Barlakourou	54,000	7,200	1,100	188,000	25,100	3,800
	Badioké & H.	100,000	13,300	2,000			
	Koniakaré	34,000	4,600	700			
<u>ZONE No. 2 - DOWNSTREAM/LEFT BANK</u>							
9. Sobéla I	Dialakoto	33,000	4,300	700	188,000	25,100	3,800
	Tinntila	86,000	11,500	1,700			
	Kouroukondi	69,000	9,300	1,400			
10. Banfara	Maréna	151,000	20,200	3,000	216,000	28,900	4,300
	Goumbalan	65,000	8,700	1,300			
<u>ZONE No. 3 - UPSTREAM/RIGHT BANK</u>							
11. Nounkala	Firia	111,000	14,900	2,300	189,000	25,300	3,900
	Madinandi/ Sandégnan	78,000	10,400	1,600			
12. Tintioulen	Tonididji	117,000	15,500	2,400	363,000	48,100	7,500
	Ganfan	75,000	9,900	1,500			
	Kambou & H.	57,000	7,500	1,200			
	Konkorma	98,000	13,000	2,000			
	Kouroundi	16,000	2,200	400			
<u>ZONE No. 4 - UPSTREAM/LEFT BANK</u>							
13. Road Solo-Niaré	Bambouta	76,000	10,200	1,500	174,000	23,400	3,500
	Kira Goungoudala & H.	98,000	13,200	2,000			
<u>ZONE No. 5 - UPSTREAM/SOUTH</u>							
14. Kologo I	Diba	77,000	10,300	1,600	77,000	10,300	1,600
TOTAL		2,654,000	354,200	54,000			

* No. of Houses taken from table II and increased by 10% for margin of error.

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TABLE IV
ESTIMATE OF BUILDING MATERIAL QUANTITIES FOR GRANARY CONSTRUCTION*

<u>Resettlement Site</u>	<u>Village Grouping & Hamlet (H)</u>	<u>Total Bricks</u>	<u>Total Bamboos</u>	<u>Total Straw</u>	<u>Total Bricks/ Grouping</u>	<u>Total Bamb./ Grouping</u>	<u>Total Straw Group.</u>
<u>ZONE No. 1 - DOWNSTREAM/RIGHT BANK</u>							
1. Bingassi I	Bamafélé	50,000	7,800	1,100	50,000	7,800	1,100
2. Bingassi II	Samantoutou Bantandjoké & H.	10,000 26,000	1,600 4,100	200 550	36,000	5,700	750
3. Faradala	Diokéli & H. Ougoudinko & H.	59,000 63,000	9,300 10,000	1,250 1,350	122,000	19,300	2,600
4. Mintégnan	Kéniéba	54,000	8,500	1,150	54,000	8,500	1,150
5. Dékéliourou I	Nigui Farabandi	23,000 43,000	3,700 6,700	500 900	66,000	10,400	1,400
6. Dékéliourou II	Soukoutali & H. Sékokoto	30,000 10,000	4,800 1,500	650 200	40,000	6,300	850
7. Dalafara	Kéniékéniéko Souroufouga	45,000 8,000	7,100 1,300	950 150	53,000	8,400	1,100
8. Kolonindala	Barlakourou Badioké & H. Koniakaré	22,000 48,000 12,000	3,500 7,500 1,900	450 1,000 250	82,000	12,900	1,700
<u>ZONE No. 2 - DOWNSTREAM/LEFT BANK</u>							
9. Sobéla I	Dialakoto Tinntila Kouroukondi	11,000 37,000 28,000	1,700 5,900 4,300	200 800 600	76,000	11,900	1,600
10. Banfara	Maréna Goumbalan	49,000 28,000	7,600 4,300	1,000 600	77,000	11,900	1,600
<u>ZONE No. 3 - UPSTREAM/RIGHT BANK</u>							
11. Nounkala	Firia Madinandi/ Sandégnan	37,000 35,000	5,700 5,500	750 750	72,000	11,200	1,500
12. Tintioulén	Tondidji Ganfan Kambou & H. Konkorma Kouroundi	52,000 29,000 39,000 37,000 8,000	8,200 4,600 6,200 5,800 1,200	1,100 600 850 750 150	165,000	26,000	3,450
<u>ZONE No. 4 - UPSTREAM/LEFT BANK</u>							
13. Road Solo - Niarékira	Bambouta Goungoudala	34,000 44,000	5,300 6,800	700 900	78,000	12,100	1,600
<u>ZONE No. 5 - UPSTREAM/SOUTH</u>							
14. Kologo I	Diba	34,000	5,400	650	34,000	5,400	650
TOTALS		1,005,000	157,800	21,050			

* No. of Granaries taken from table II and increased by 20% for margin of error.

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TABLE V

ESTIMATE OF BUILDING MATERIAL QUANTITIES FOR KITCHEN CONSTRUCTION §

Resettlement Site	Village Grouping & Hamlet(H)	Total Bricks	Total Bamboo	Total Straw	Total Bricks/ Grouping	Total Bamboo/ Grouping	Total Straw/ Grouping	
<u>ZONE NO. 1 - DOWNSTREAM/RIGHT BANK</u>								
1.	Bingassi I	Bamafélé	15,500	1,860	248	15,500	1,860	248
2.	Bingassi II	Samantoutou	2,500	240	40	7,500	840	120
		Bantandjoké & H.	5,000	600	80			
3.	Faradala	Diokéli & H.	11,000	1,320	176	23,000	2,760	368
		Ougoudinko & H.	12,000	1,440	192			
4.	Mintégnan	Kéniéba	13,500	1,560	216	13,500	1,560	216
5.	Dékélikourou I	Nigui	15,500	1,860	248	22,500	2,700	360
		Farabandi	7,000	840	112			
6.	Dékélikourou II	Soukoutali & H.	3,500	420	56	5,000	600	80
		Sékokoto	1,500	180	24			
7.	Dalafara	Kéniékéniéko	16,500	1,980	264	18,000	2,160	288
		Souroufouga	1,500	180	24			
8.	Kolonindala	Barlakourou	7,500	840	112	15,500	1,800	248
		Badioké & H.	6,000	720	96			
		Koniakaré	2,000	240	40			
<u>ZONE NO. 2 - DOWNSTREAM/LEFT BANK</u>								
9.	Sobéla I	Dialakoto	1,000	120	16	16,000	1,920	256
		Tinntilá	7,500	900	120			
		Kouroukondi	7,500	900	120			
10.	Banfara	Maréna	9,000	1,080	144	14,500	1,740	232
		Goumbalan	5,500	660	88			
<u>ZONE NO. 3 - UPSTREAM/RIGHT BANK</u>								
11.	Nounkala	Firia	5,500	660	88	13,000	1,560	208
		Madinandi/ Sandégnan	7,500	900	120			
12.	Tintioulen	Tondidji	6,000	720	96	25,500	3,540	472
		Ganfan	7,500	900	120			
		Kambou & H.	5,000	600	80			
		Konkorma	9,500	1,140	152			
		Kouroundi	1,500	180	24			
<u>ZONE NO. 4 - UPSTREAM/LEFT BANK</u>								
13.	Road Solo-Niarékira	Bambouta	6,500	780	104	15,000	1,800	240
		Goungoudala	8,500	1,020	136			
<u>ZONE NO. 5 - UPSTREAM/SOUTH</u>								
14.	Kologo I	Diba	6,500	780	104	6,500	780	104
		TOTALS	215,000	25,620	3,440			

§ No. of Kitchens taken from Table II and increased by 10% for margin of error. -37-

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TABLE VI
ESTIMATE OF BUILDING MATERIAL QUANTITIES FOR CHICKEN HUTCH CONSTRUCTION *

<u>Resettlement Site</u>	<u>Village Grouping & Hamlet (H)</u>	<u>Total Bricks</u>	<u>Total Bricks/Grouping</u>
<u>ZONE No. 1 - DOWNSTREAM/RIGHT BANK</u>			
1. Bingassi I	Bamafélé	4,200	4,200
2. Bingassi II	Samantoutou Bantandjoké	600 1,400	2,000
3. Faradala	Diokéli & H. Ougoudinko & H.	3,100 3,400	6,500
4. Mintégnan	Kéniéba	3,000	3,000
5. Dékélikourou I	Nigui Farabandi	2,600 3,000	5,600
6. Dékélikourou II	Soukoutali & H. Sékokoto	2,500 800	3,300
7. Dalafara	Kéniékéniéko Souroufouga	3,500 300	3,800
8. Kolonindala	Barlakourou Badioké & H. Konialaré	1,700 1,800 600	4,100
<u>ZONE No. 2 - DOWNSTREAM/LEFT BANK</u>			
9. Sobéla I	Dialakoto Tinntila Kouroukondi	1,000 2,400 1,500	4,900
10. Banfara	Maréna Goumbalan	3,100 1,100	4,200
<u>ZONE No. 3 - UPSTREAM/RIGHT BANK</u>			
11. Nounkala	Firia Madinandi/Sandégnan	2,900 2,100	5,000
12. Tintioulen	Tondidji Ganfan Kambou & H. Konkorma Kouroundi	2,100 2,200 1,200 2,900 400	8,800
<u>ZONE No. 4 - UPSTREAM/LEFT BANK</u>			
13. Road Solo - Niarékira	Banbouta Goungoudala	1,800 2,200	4,000
<u>ZONE No. 5 - UPSTREAM/SOUTH</u>			
14. Kologo I	Diba	1,800	1,800

* No. of Chicken Hutches taken from Table II and increased by 10% for margin of error.

TOTAL 61,200

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TABLE VII

ESTIMATE OF BUILDING MATERIAL QUANTITIES FOR LIVESTOCK SHELTERS §

<u>Resettlement Site</u>	<u>Village Grouping & Hamlets (H)</u>	<u>Total Bricks</u>	<u>Total Bamboe</u>	<u>Total Straw</u>	<u>Total Bricks/ Grouping</u>	<u>Total Bamboo/ Grouping</u>	<u>Total Straw/ Grouping</u>
<u>ZONE NO. 1 - DOWNSTREAM/RIGHT BANK</u>							
1. Bingassi I	Bamafélé	6,650	950	152	6,650	950	152
2. Bingassi II	Samantoutou	700	100	16	3,150	450	72
	Bantandjoké & H.	2,450	350	56			
3. Faradala	Diokéli & H.	4,550	650	104	9,450	1,350	216
	Oug udinko & H.	4,900	700	112			
4. Mintégnan	Kéniéba	4,200	600	96	4,200	600	96
5. Dékéliourou I	Nigui	2,100	300	48	5,600	800	128
	Farabandi	3,500	500	80			
6. Dékéliourou II	Soukoutali & H.	3,500	500	80	4,200	600	96
	Sékókoto	700	100	16			
7. Dalafara	Kéniékéniéko	8,050	1,150	184	9,100	1,300	208
	Souroufouga	1,050	150	24			
8. Kolonindala	Barlakourou	1,750	250	40	12,600	1,800	288
	Badioké & H.	8,400	1,200	192			
	Koniakaré	2,450	350	56			
<u>ZONE NO. 2 - DOWNSTREAM/LEFT BANK</u>							
9. Sobéla I	Dialakoto	700	100	16	4,550	650	104
	Tinntila	2,800	400	64			
	Kouroukondi	1,050	150	24			
10. Banfara	Maréna	4,900	700	112	7,700	1,100	176
	Goumbalan	2,800	400	64			
<u>ZONE NO. 3 - UPSTREAM/RIGHT BANK</u>							
11. Nounkala	Firia	4,900	700	112	7,700	1,100	176
	Madinandi/Sandégnan	2,800	400	64			
12. Tintioulén	Tondidji	1,050	150	24	10,850	1,550	248
	Ganfán	3,500	500	80			
	Kambou & H.	2,100	300	48			
	Konkorma	3,500	500	80			
	Kouroundi	700	100	16			
<u>ZONE NO. 4 - UPSTREAM/LEFT BANK</u>							
13. Road Solo - Niarékira	Bambouta	2,800	400	64	6,300	900	144
	Goungoudala	3,500	500	80			
<u>ZONE NO. 5 - UPSTREAM/SOUTH</u>							
14. Kologo I	Diba	2,800	400	64	2,800	400	64
TOTALS		94,850	13,550	2,168			

§ No. of Livestock Shelters taken from Table II and increased by 10% for margin of error.

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By Priority Resettlement Area	Village Grouping	TABLE VIII PHASE I - VILLAGE CONSTRUCTION				No. of Presses	No. Days Brick- making§§	No. of Building Teams	No. Days Building	Tot. Days Building
		No. of Houses	No. House Bricks§	No. Supp. Bricks§	Total Bricks					
Dékélikourou II	Soukoutali Sékokoto	323	194,000	52,500	246,500	8	80	4	105	185/ 7 mos.
Dalafara	Kéniékéniéko Souroufouga	267	160,000	83,900	243,900	8	79	4	87	166/ 5.4 mos.
Sobéla I	Dialakoto Kouroukondi	170	102,000	51,750	153,750	4	100	4	55	155/ 6 mos.
Mintégnan	kéniéba	283	170,000	74,700	244,700	8	80	4	92	172/ 6.6 mos.
Dékélikourou I	Nigu Farabandi	365	219,000	99,700	318,700	8	104	6	80	184/ 7 mos.
Tintioulen	Konkorma Kourondi	190	114,000	63,500	177,500	6	77	4	62	139/ 5.4 mos.
Bingassi I	<u>Bamafélé</u> 12 villages	<u>267</u> 1,865	<u>160,000</u> 1,119,000	<u>76,350</u> 502,400	<u>236,350</u> 1,621,400	<u>8</u> 50	77	4	87	164/ 6.3 mos.

§ Brick totals taken from Tables IV,V,VI,VII,VIII

§§ No. of Brickmaking days is calculated according to 1 press produces 500 bricks/day, plus 30% for unforeseen delays.
No. of House Building days is calculated as 1 team of four workers can raise one house/day, plus 30% for unforeseen delays.

§§§ Total No. of building days includes both brickmaking and house building. The total no. of days is divided by 26 working days/month to calculate the no. of months, assuming that the work doesn't go simultaneously. This total is the maximum amount of time it should take to rebuild the houses in the villages.

No. of Bamboo for Houses Phase I: 149,000 No. of Bamboo for Supplementary Structures: 70,720 Total Bamboo: 219,720
No. of Straw Bundles for Houses Phase I: 22,800 No. of Straw Bundles for Sup. Struct.: 9,620 Total Straw Bundles: 32,420
No. of Wood Support Beams for Granaries Phase I: 9,910
No. of Stones for Granaries Phase I: 595 m3

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TABLE IX
PHASE II - VILLAGE CONSTRUCTION

Resettlement Area	Village Grouping	No. of Houses	No. of House Bricks §	No. of Supplem. Bricks §	Total No. of Bricks	No. of Presses	No. Days Brick making §§	No. of Building		Total §§ Days Build- Days Build- Days
								Teams	No. Days making §§	
Noumkala	Firia Madinandi/Sandégnan	315	189,000	97,700	286,700	8	93	6	68	161/ 6 mos.
Tintioulen	Tondidji Ganfani Kambou	415	249,000	150,650	399,650	8	130	8	67	197/ 7.5 mos.
Sobéla	Tinntila	143	86,000	49,700	135,700	4	88	4	46	134/ 5 mos.
Banfara	Goumbalan Maréna	360	216,000	103,400	319,400	8	104	6	78	182/ 7 mos.
Kolonindala	Barlakourou Koniakaré Badioké	313	188,000	114,200	302,200	8	98	6	68	166/ 6.5 mos.
Faradala	Ougoudinko Diokéli	457	274,000	160,950	434,950	8	41	8	74	215/ 8 mos.
Bingassi II	Samantoutou Bantandjoké	137	82,000	48,650	130,650	4	85	4	45	130/ 5 mos.
Road Solo - Niarékira	Goungoudala Bambouta	290	174,000	103,300	277,300	8	90	6	63	153/ 6 mos.
Kologo I	Diba	128	77,000	45,100	122,100	4	79	4	42	121/ 4.5 mos.
	18 villages	2,558	1,535,000	873,650	2,408,650	50				

§ Brick totals taken from Tables IV,V,VI,VII,VIII

§§ No. of Brickmaking days is calculated according to 1 press producing 500 bricks/day. 30% for unforeseen delays.
No. of house building days is calculated as 1 team of four workers raising 1 house/day, plus 30% for unforeseen delays.

§§§ Total No. of building days includes both brickmaking and house building. The total no. of days is divided by 26 working days/month to calculate the no. of months to complete the building. This is assuming that the work doesn't go simultaneously. This total is the maximum amount of time it should take to rebuild the houses in the villages.

No. of Bamboo for Houses Phase II: 205,200 No. of Bamboo for Supplementary Structures: 126,250 Total Bamboo: 331,450

No. of Straw Bundles for Houses Phase II: 31,200 No. Straw for Supplementary Structures: 17,038 Total Straw: 48,238

No. of Wood Support Beams for Granaries Phase II: 18,790

No. of Stones for Granaries Phase II: 1,127 m3

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TABLE X

COST ANALYSIS FOR VILLAGE RECONSTRUCTION (in dollars)I. Construction of Houses

METHOD	NO. of UNITS	UNIT PRICE (m ²)	UNIT AREA (m ²)	COST per UNIT	SUB-TOTAL	DISTANCE COEFFICIENT (20%)	SUPERVISION (6%)	TOTAL COST	ESTIMATE of EXECUTION (months)
Option 1 Large Private Contractor	4500	\$40.00	16	\$.640 .00	\$2 880,000.00	576,000.00	\$172,800.00	\$3,628,800.00	18
Option 2 Local Jobber (Tacheron)	4500	20.00	16	320.00	1,440,000.00	288,000.00	86,400.00	\$ 1,814,400.00	24
Option 3 Technical Assistance NGO or PYO	4500	13.00	16	208.00	936,000.00	187,200.00	-----	\$ 1,123,200.00	28
Option 4 Resettlement Project Unit (RPV)	4500	9.75	16	156.00	702,000.00	-----	-----	\$ 702,000.00	32
Option 5 Village Administered	4500	6.50	16	104.00	468,000.00	-----	-----	\$ 468,000.00	44

II. Provision of Materials for Supplementary Structures

Option	QTY BRICK	QTY BAMBOO	QTY STRAW	QTY WOOD	QTY DOORS	QTY STONES	TOT. COST ^{\$} BRICK	TOT. COST ^{\$} BAMBOO	TOT. COST ^{\$} STRAW	TOT. COST ^{\$} WOOD	TOT. COST ^{\$} DOORS	TOT. COST ^{\$} STONE	TOT. COST MATERIALS (\$)	(20%) TRANS-PORT (\$)	OVERHEAD (\$)	TOT. COST PROVISION MATERIALS (\$)
Option 1	1,445,000	222,000	30,000	30,000	750	1,800m ³	\$ 101,150	\$ 44,400	\$ 48,000	\$ 60,000	\$ 4,500	\$ 8,370	\$ 266,420.	\$ 53,284	(30%) 79,926	\$ 399,630.00
Option 2	"	"	"	"	"	"	"	"	"	"	"	"	"	"	(20%) 53,284	\$ 372,988.00
Option 3	"	"	"	"	"	"	"	"	"	"	"	"	"	"	(10%) 26,642	\$ 346,346.00
Option 4	"	"	"	"	"	"	"	"	"	"	"	"	"	"	-----	\$ 319,704.00
Option 5	"	"	"	"	"	"	"	"	"	"	"	"	"	"	---	\$ 266,420.00

TOTAL OF I. & II.

	I. <u>Construction of Houses</u>	II. <u>Provision of Materials for Supplementary Structures</u>	<u>GRAND TOTAL</u>
Option 1	\$ 3,628,800.00	\$ 399,630.00	\$ 4,028,430.00
Option 2	1,814,400.00	\$ 372,988.00	2,187,388.00
Option 3	1,123,200.00	6,346.00	1,469,546.00
Option 4	702,000.00	\$ 319,704.00	\$ 1,021,704.00
Option 5	468,000.00	\$ 266,420.00	\$ 734,420.00

\$ UNIT COSTS

Cost/Block -	\$.07
Cost/Bamboo Pole -	\$.20
Cost/Straw Bundle-	\$ 1.60
Cost/ Door 1mx.5m -	\$ 6.00
Cost/Wood Beam -	\$ 2.00
Cost/Stone (m ³) -	\$ 4.65

7.2.6. VILLAGE ADMINISTRATIVE/SOCIAL INFRASTRUCTURE

7.2.6.1. INTRODUCTION

This analysis addresses the problem of administrative and government service buildings now in use in Bamafele which will be flooded by the construction of the Manantali Dam. Though the majority of village structures are of traditional mud block and thatch construction, the buildings serving administrative and social infrastructure generally use the higher standards of improved banco or concrete construction. The replacement of these structures will be necessary for the reestablishment of these services normally available to the village population.

The design requirements and cost estimate for the buildings concerned, shown in Sections II and III, are based on GRM standard plans developed by the appropriate ministry. These are followed by recommendations in Section IV.

7.2.6.2. DESIGN REQUIREMENTS

The building listed below are to be constructed at New Bamafele (except where noted) replacing those inventoried during village surveys. In each case, detailed measurements were taken and building materials noted.

- a) 2 School Buildings of 600m² with a total of 9 classrooms and an office, each room being 6m x 10m, with a ceiling of 4m. These will replace the existing six room school at Bamafele and three room school at Kenieba. Existing buildings are constructed of mud block, cement floors and plastering, metal doors, windows and roofing.
- b) Administrative Building for local government personnel of 100m² containing three offices and a storage room, each room 5m x 5m. The existing offices used are of mud block, cement floors and plastering, metal doors, windows and roofing.
- c) Maternity Ward/MCH Clinic of 170m² containing waiting, consultation and delivery rooms, in-patient wards, storage rooms, a kitchen and toilets, as part of health infrastructure to be placed in the project area (see Annex 7.7.).
- d) Dispensary of 75m² containing waiting, consultation and treatment rooms, a storage room and toilet, to replace existing health clinic comprised of four traditional mud block buildings of approximately 72m². The Dispensary and Maternity Ward/MCH Clinic will be in the same compound and adjacent to each other.
- e) Health Outpost of 50m² containing a waiting and consultation room, storage room and toilet. This is to be placed in the zone of Tintioulen where the second largest village will be resettled.
- f) Pharmacy of 115m² containing sales and storage rooms, to be part of the health infrastructure to be placed in the project area.

g) Forestry Post of 75m² containing an office and storage rooms, to replace existing forestry services facility of mud block construction.

h) Veterinary Post of 75m² containing an office and storage room, to replace existing veterinary services facility of mud block construction.

i) Housing totalling 250m² divided in to 3 modest dwellings of 55m² including cooking and toilet areas - for the school principal, medical officer and assistant to the chief administrative official, and a dwelling of 85m² for the chief administrative official with cooking and toilet areas, replacing existing banco and cement house of approximately 75m².

j) Administrative Guest Facility of 76m² consisting of four rooms each 4m x 4m and a toilet area of 3m x 4m, replacing existing lodge of cement block construction of approximately 150m².

Also covered under reconstruction of infrastructure are improved warehouse facilities existing in Bamafele. A large warehouse of 200m², built of concrete and cement block serves the government agricultural extension agency (ODIPAC), and a smaller storage facility of 75m² serves the local Federation of Rural Cooperatives. The replacement of these structures is covered under Annex 7.2.1 where site warehouses will be turned over to these organizations for post-project use, the central warehouse of 200m² for ODIPAC and site warehouses of 75m² for the Rural Cooperatives.

The replacements financed by this project will be built of cement block for walls and corrugated metal roofing on stone rubble foundations. These higher standards are currently applied to all new GRM structures and the designs and cost estimates are based on standard plans from the concerned ministries.

7.2.6.3 COST ESTIMATE

<u>Type of Unit</u>	<u>Unit Area (m²)</u>	<u>Cost/ m²(\$)*</u>	<u>Total Cost</u>
1. <u>Schools</u> - 9 standard classes (6m x 10m), and 1 office (6m x 10m)	600	\$250	\$150,000.00
2. <u>Administrative Building</u> - three offices (5m x 5m) and 1 storage room (5m x 5m)	100	250	25,000.00
3. <u>Maternity Ward/MCH Clinic</u> - five medical rooms for office consultation and delivery (3m x 5m), two storage rooms (2m x 2.5m), kitchen (3m x 5m), two toilets (2m x 2.5m), guard/workers room (2.5m x 4m) and waiting area (4m x 5m)	170	250	42,500.00
4. <u>Dispensary</u> - two medical rooms for consultation and treatment (3m x 5m), one storage room (3m x 5m), one guard/workers room (2.5m x 4m), 1 toilet (2m x 2.5m), and waiting area (3m x 5m)	75	250	18,750.00

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	<u>Unit Area (m2)</u>	<u>Cost/ m2 (\$) *</u>	<u>Total Cost</u>
5. <u>Health Outpost</u> - 1 medical room for consultation and treatment (3m x 5m), one storage room (3m x 5m), one toilet (2m x 2.5m), and waiting area (2.5m x 4m)	50	250	12,500.00
6. <u>Pharmacy</u> - one sales room (6m x 10m), one storage room (6m x 6m), and veranda (1.2m x 16m)	115	250	28,750.00
7. <u>Forestry Post</u> - one office (5m x 5m), two storage rooms (5m x 5m)	75	250	18,750.00
8. <u>Veterinary Post</u> - one office (5m x 5m), two storage rooms (5m x 5m)	75	250	18,750.00
9. <u>Housing</u> - Four dwellings, three of 55m2, one of 85m2	250	250	62,500.00
10. <u>Administrative Guest Facility</u> - four rooms (4m x 4m), one washroom/ toilet (3m x 4m)	76	250	<u>19,000.00</u>
		TOTAL	396,500.00
		20% Distance Factor	<u>79,300.00</u>
		GRAND TOTAL	475,800.00

*Unit price based on Ministry of Health estimates, and DNUC prices found in Annex 7.2.1.

7.2.6.4 RECOMMENDATIONS

As the buildings serving Administrative and Social Infrastructure are of higher construction standards, a private construction firm will be used to execute the work. These facilities will be constructed and ready for operation by May 1986 when the first phase of the population transfer will take place.

7.3 ANNEX: ECONOMIC ANALYSIS

This project is not intended to bring about a net improvement in the economic well-being of the population of the Bafing Valley near the Manantali Dam. Nor is it intended to guarantee that a basis for future economic development is directly established through institution-building, substantial construction of productive infrastructure, etc. Rather, the concern in this project's design has been to minimize the costs of resettlement. Costs have been considered at three different levels:

1. at the level of the population to be resettled -- where the objective has been to minimize the losses which they will have to absorb as the reservoir behind the dam fills and covers their fields, trees, and houses;
2. at the level of the Government of Mali, as it takes on the responsibility to assist the population to resettle; and
3. in AID, as it seeks to make its budget and staff for this project go as far as possible.

Just how the project design solves the problem of cost-minimization is discussed in some detail below. In general least-cost alternatives were sought and chosen if possible. However, least-cost options were not always the most cost-effective in terms of other design criteria.

Three critical conditions for the implementation of this project generally led to the choice of slightly more expensive but more cost-effective interventions than those which might have been lower cost:

1. the time constraint -- the water will begin rising in 1987 and the people must be moved by then; this gives only three dry seasons to accomplish all infrastructural work;
2. the project area has been relatively inaccessible; the explosion of economic activity in the Manantali area due to the dam construction has just brought the entire population into the market economy (both labor and commodity markets) with a bang; and
3. the AID Mission in Bamako is not only far away but also has limited manpower to manage such a complex project.

Each of these constraints will be seen as affecting the choice of project intervention at each level: resettled population, Government of Mali, and AID. The total impact of these constraints is seen in the bottom line of \$18,335,000. It was not possible to hold to the initial estimate of \$10 million.

Minimizing Costs for the Local Population

It is impossible to place a monetary value on all of the assets which the population to be resettled will be forced to give up in the process of resettlement. The Socio-Economic Survey carried out by IER with funding from UNDP in mid-1983 attempted to evaluate the worth of buildings and wells; the survey team assessed the current value of such non-movable property at just over \$600,000. They did not assess the value of trees nor did they attribute any value to investments people have made in (a) clearing agricultural land, (b) maintaining tracks, trails, and wells, or (c) developing detailed knowledge about the best ways to make a living given their current resources. These assets will, however, be lost and the project will incur direct financial costs to replace some, although not all, of them.

The project will help to compensate the settlers for their losses in four ways:

1. providing physical infrastructure to replace that which will be destroyed;
2. by assisting in the task of clearing new agricultural fields -- that is, providing mechanical equipment to do an initial clearing;
3. by paying cash compensation for the loss of production of important mango trees; and
4. by supplying enough food aid for enough time to enable people to establish and become enough accustomed to their new farms so that they can again produce their own food supplies.

Table 7.3.1 summarizes the costs which the project will cover. For each element of the four interventions, alternatives which were of both lower and higher costs were considered.

Table 7.3.1 Loss Compensation Plan for Settlers

<u>Element</u>	<u>Higher Cost</u>	<u>Lower Cost</u>	<u>Selected Option: Cost</u>
INFRASTRUCTURE:			
Houses	Cement or cin- varam blocks with construc- tion completely done by contractor	Let people do all own building as they like	4500 mud block shelters constructed by con- tractor; settlers pro- vided materials for some 5000 other household structures (\$2,701,000)

<u>Element</u>	<u>Higher Cost</u>	<u>Lower Cost</u>	<u>Selected Option: Cost</u>
Public Buildings	both replacing existing units and adding new social infrastructure	Let GM provide any purchased inputs outside of the AID-financed project	Warehouse for each village for transition; conversion of project buildings to post-project public use after move; minimal reconstruction of arrondissement buildings (\$769,000)
Roads/Tracks	Construction or upgrading of 10 road segments (206km) providing ease of use during project and post-project improvements	Simply grading by Travaux Publiques or project equipment with minimal short-term improvements	Adequate construction of feeder roads in new village sites; grading of all other track segments to permit access during project (\$2,214,000)
Wells	High quality hand-dug wells; drilled wells with pumps	Current standard hand-dug wells	Drilled wells with adjacent cisterns (\$3,426,000)
AGRICULTURAL ESTABLISHMENT:			
Clearing	Complete mechanical clearing and preparation of fields	Provision of improved tools; some chain saw assistance	Provision of improved tools; use of bulldozer and chain to do initial clearing of 5500 ha. (\$588,000)
Seeds	An improved technical package	Nothing	Emergency supplies; contingency allowance only; no line item in budget
TREES:			
Mangoes and other fruit trees	Cash payment plus establishment of nurseries in each resettlement site with improved saplings	Nothing	Cash payment of \$70 per mature tree based on recensement (\$140,000)

FOOD AID:

Only alternative considered was Distribution of
one chosen: standard World Food (delivery costs of
Program package. \$ 20,000)

It should be noted that many social costs of resettlement will not be directly covered by such a plan. Medical commodities will, however, be provided/sold by the GRM through the health facilities (\$66,000); in addition, attempts will be made to encourage other GRM projects, particularly the World Bank supported project for expending primary health care in the First Region, to locate services in the area. Information inputs will also perhaps help to alleviate the social cost of uncertainty and insecurity associated with resettlement. The team of village liaison workers (salaries and vehicles for \$78,500) and support for the Village Coordinating Committees (largely logistical support with project vehicles (\$1,500) -- to help them go back and forth between home villages and resettlement sites) will also be important in this respect.

Certain opportunity costs already perceived by the villagers have also been taken into account in the project design. The possibility of employment on the dam construction at 80,000 MF per month exerts a very strong and very understandable attraction for most young men. (This amount probably exceeds annual cash agricultural incomes for entire households in recent years). Being required to devote labor to reconstruction of one's own house -- for free -- would thus imply a special hardship for such young men. Since such young men are essential to accomplishing the task on time, however, it has been decided to allow for payment of wage rates which are competitive with those currently being paid in the overheated Manantali regional economy. Further, each contractor will be required to hire unskilled labor, to the maximum extent possible, from the population whose infrastructure is being constructed under contract.

The Manantali economy is likely to deflate rapidly after the completion of the dam as only a residual labor force will be required to maintain and operate it. At that time, it is expected that agricultural occupations will again appear more attractive to the resettled population, the opportunity cost of labor will drop, and people will again find it profitable to invest time in their own enterprises.

Costs Incurred by the Government of Mali

For the Government of Mali, the cost of the resettlement effort has two dimensions: cash and political. The cash dimension is most directly addressed by this project. Funds will be provided to cover the majority of needed infrastructure identified by the GRM and hire additional required staff (3 accountants, 3 construction technicians, 1 draftsman, 9 community development workers, 5 drivers, 5 secretaries, 2 janitors and 18 watchmen). The GRM contribution will largely be in the form of Government staff seconded to the RPU. The World Food Program contribution of food aid will supplement the AID financial input as far as the GRM is concerned.

The potential political cost of this resettlement effort to the Government of Mali if it is not well-done has been recognized in the project design. Every attempt has been made to ensure that it is minimized, not only by trying to ensure timely completion of necessary infrastructure but also by the design process itself. The extensive communication of the various joint Service Hydraulique/AID design teams with the villagers in the area has already served to alleviate some of the initial suspicion that the Government was requiring them to move for reasons other than the dam. It has also helped to create an atmosphere of willing cooperation in solving the problems of resettlement between the villagers and the GRM RPU staff already working on the project. By focussing on physical deadlines for construction and the moving, AID/GRM have also tried to avoid the (politically expensive) delays encountered in the Selingue resettlement.

AID's View: Making the Funds Go as far as Possible

For AID, the PID-approved budget level of \$10 million was the accepted cap on the costs which could be programmed in the project design. As the engineering design work proceeded, however, it became clear that this sum was minimal -- too low, in fact, to permit the project to be certain of meeting the time constraint and the Mission management constraint. By continually seeking the most cost-effective solutions to each problem of resettlement, the design team finally limited the basic project funding requirement to \$14.1 million. Addition of inflation and contingency factors boosts the expected final price tag estimate to \$18.3 million.

From the Mission perspective, an important requirement was to provide adequate funds to permit hiring highly-skilled technical assistance who could carry out day-to-day financial management duties and could provide experienced advice on the infrastructure activities in the project (\$2.7 million). In order to get the project off to as rapid a start as possible, short-term expertise is also provided for. This technical assistance will help put bid and contract documents together. There are only three dry seasons to do the work and no time can be lost in getting underway.

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7.4 ANNEX: SOCIAL SOUNDNESS ANALYSIS

7.4.1 BENEFICIARIES

The target population of the project includes all the people who will be forced to move by the artificial lake that will be created behind the dam. These will be the direct beneficiaries of project assistance. In addition, people in villages which will not be flooded out but which will have fields, domestic trees, or satellite farming hamlets inundated, or which will find their normal sources of domestic water contaminated will also receive assistance from the project. This will take the form of water points, land clearing, and social support.

The displaced population will be the direct beneficiaries of employment opportunities financed by the project activities. Others employed to achieve the resettlement will likewise benefit. Villagers and others will gain cash income from the sale of construction materials such as bamboo and thatch. Contractors or Malian government agencies who win contracts will derive profits or experience from the work. The government of Mali and the Senegal River Basin Development Organization will see some 11,000 people moved out of the lake retinue area in a timely fashion which will avoid retarding the completion of the dam.

7.4.2 CONTEXT

An understanding of the setting in which the resettlement will take place will increase the likelihood that the efforts of project planners and are both appropriate and successful.

7.4.2.1 SOCIAL PATTERNS

The 11,000 people to be moved or otherwise directly affected by the dam construction and filled reservoir are almost entirely of the Malinke ethnic group. People are grouped by clan, lineage, and extended family household in which the eldest male acts as custodian of the family assets, makes the important decisions which bear upon marital alliances and production, and represents the family before the village council and government authorities.

These people trace their heritage to the founding of the Mali Empire and to three particular culture heros -- Soundiata Keita, Tiramakan Traore, and Fakoli Koroma. Inter-clan social relationships are thus based on the historical legends which have been and still are transmitted by individuals who specialize in this pursuit. The point to be taken here is that no historical animosities or rivalries breed serious social discord among these groups.

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Village leadership is vested in a the eldest male member of the founding (or conquering) lineage. Decisions which affect the village as a whole are made by a council consisting of all extended family heads. From this group is named an elder to represent the village in public (political party and governmental) affairs.

Village social strata can include people who are considered to be descended from nobles, from non-noble freemen, from endogamous occupational specialists (e.g., blacksmiths), or from ex-serfs or captives. Social structures include age-grade based groups of both males and females, hunter associations, and other occult associations such as the Nama or Koma.

Decisions which affect the resettlement effort will no doubt be made by the council of elders.

7.4.2.2 PRODUCTION SYSTEMS

Crop cultivation, animal husbandry, and placer mining are major components in the rural production system.

The cultivation of a special mix of crops is aimed essentially at providing food subsistence for the family. Crops grown are mainly sorghum, millet, fonio, and peanuts, with corn planted adjacent to the family compound and rice sown in low-lying rainfed areas. The amount of fonio grown provides insurance against complete crop failures. In addition, vegetable gardens, domestic and wild tree crops, and other foodstuffs gathered in the wild provide highly important supplements to the family diet. Further, this is an area where wild game still constitutes a major part of the diet.

Dry season river recession and hand-watered crops include those for both household consumption and for sale. The former are vegetables such as okra, melons, tomatoes, and bitter tomato. Tobacco, indigo, and onions are grown for sale because they are storable and transportable. Cotton is grown extensively by traditional methods and is locally spun and woven for traditional clothing and blankets.

Preparing fields for sowing is one of the most physically demanding tasks that must be accomplished before the rains set in. Clearing new areas requires that trees be cut and brush cleared. In some instances the circumference of large trees will be incised with an ax or machete, bushes cut, and after a short time for drying, the entire area will be burned off. Useable wood -- for cooking, for fence and household construction, for implements (mortars, pestles, stools, benches, tool handles, bowls), or for medicinal purposes -- will be salvaged and stored. Note that these fields are distant from the household

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and constitute but a part of the crop production area.

In this regard, we can consider that people imbued with traditional knowledge in this region exploit six to seven different crop areas. There are vegetable gardens within the household concession. There are fields farmed every year which are immediately adjacent to the concession and in which corn is usually sown early and harvested early. A third area, farther removed from the household, is reserved for plots of peanuts, millet, sorghum, and fonio. These are cultivated for two to three years, the fields then rotated both among the crops and to new locations laterally adjacent. These locations are normally close enough to the household so that they are tended on a daily basis by family members who return to the concession to eat and sleep each night. A fourth area may be constituted by the farming hamlet. This is created when population growth increases the pressure on cultivable land nearby the village. A part of the extended family will move to a location where there is good land which has lain fallow for as many as 15-20 years. A house (or houses) and one or more granaries will be built. Here fields will be cleared, crops sown and tended, the harvest gathered, processed, and put in temporary granaries. During this time the family dwells here. It reenters the village concession only after the farm cycle has been completed.

Sometimes an increase in village population, sometimes simply family fission results in permanent habitation of the once-seasonal hamlet, in which case it becomes a small village, a satellite of the original.

Other areas which may be cultivated are those low-lying spots where rain water collects and rice is grown; river banks where dry season crops are planted as the river level recedes and the residual moisture nourishes the plants; and other locations of low elevation where sub-surface water can be exploited by traditional hand-dug wells and dry season gardens are tended.

Note that this description does not pretend to distinguish those special areas in the larger pattern which may be particularly exploited because of micro-environmental soil conditions or humidity. Yet these are normally identifiable by the local population. It is important to note also that gardens and fields immediately adjacent to the concession and the village have their fertility enhanced on an annual basis through composting with household refuse and manuring. Moreover, the third layer -- that is, the peanut, millet, sorghum fields -- will also have a fertility artificially built up through the pattern of cropping practices they receive.

Modern agricultural methods are not widely practiced in the project area. Compared to other regions of Mali, relatively few families use plows, fertilizers, insecticides, herbicides, or

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follow the practices recommended by the local extension agency, ODIPAC. The difficulty of access and egress to the zone, the limited markets for produce, and low produce prices also affect farming practices. The construction of the dam will bring much change to methods of crop cultivation in the future. The introduction of irrigation techniques in the Bafing Valley will likely intensify production if the farmer believes it will be profitable.

Livestock production is extensive. For most of the year, animals roam freely to forage unattended by any herders. Sheep and goats will usually be tethered in the family compound at night but are let out during the day to browse. Cattle are corralled only during the cropping season when they pose a threat to crops. During this period they will be attended by a herder, generally a family member but sometimes a hired hand. They will be let out to graze and water during the day but returned to the corral at night.

Small ruminants are kept for meat production and ritual use. They are owned by the women of the family who may do with them what they wish. Cattle are raised mainly for the purpose of amassing family wealth, particularly to serve as gifts to families whose daughters would be wed by male members of the household. They are considered to be the property of the entire family under the custody of the eldest male. Cattle also serve as ceremonial animals slaughtered on the occasions of rites of passage ceremonies marking birth, circumcision, marriage, and death.

Placer-mining is a dry season activity which has been practiced for centuries in the Bafing river valley. Women pan for gold in the river and streambeds and dig out the sides of hills, washing the soils in calabashes so that the heavy dust will sink to the bottom where it will be seen and gathered. Men practice the centuries-old technique of digging holes deep into the earth, exactly as was described by medieval Arab authors. This mining practice cannot be done during the dry season since water would fill the shafts and tunnels.

Migration is another dry season activity which is traditionally practiced with various objectives: hunting, wage labor in the peanut basin in Senegal, apprenticeship for learning purposes, renewing ties with relatives, or simply exploration and adventure. Dry season travel to visit relatives is the norm for female family members.

For those who do not travel or migrate during the non-farm season, much work has to be done prior to the next rains. This includes building or repairing household structures, building or moving corrals, stocking firewood, gathering and processing wild produce, gathering manure and household refuse to transport and

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spread on the fields, and making or repairing household implements. Life is generally labor intensive but perhaps the most laborious tasks are preparing both new and annually cultivated fields for the next cropping season. The clearing and hoeing must be done during the hottest time of the year, the most intensive effort required when water and foodstuffs may be in short supply.

7.4.2.3 SETTLEMENT PATTERNS/HOUSING

Villages in the Bafing valley tend to be settled adjacent to the river, an unusual pattern given the incidence of river blindness (onchocerciasis) in the valley. The villages^s are mostly composed of two to three different clans or lineages but sometimes contain only one. Strong relations tend to exist between villages, based mainly on the exchange of daughters.

Extended family lineages are gathered in compounds which often group as many as four generations. The compound or concession spreads out in a circular fashion from a central courtyard area. It includes sleeping dwellings, cooking structures, granaries, livestock enclosures, chicken pens, and walls, sometimes artisanal work space. Reception vestibules are often a separate structure in the concession. Every adult male has his own sleeping dwelling as do married women who have borne children. Youngsters and girls pass the night in the house of their mother while older male siblings have their own separate sleeping houses.

Sleeping dwellings are generally built of mud walls using the wattle and dab method of bamboo lattice-work over which mud is packed, or using hand-formed mud blocks laid one upon another. Roofs are conical, framed with bamboo poles intersticed with split bamboo strips and bound with either cultivated fiber (dah) or strips of vine gathered in the wild. Over the roof framing several rolls of bound reeds, usually perennial grasses (waaga), are layed from peak to edge, allowing an overlap at the top of walls of about a foot to facilitate rainfall run-off. The traditional building method, as in much of the higher rainfall and forested areas of West Africa, is that of wattle and dab, but this is being gradually replaced by block construction. However, where structures are intended as only temporary or must be put up in a hurry the wattle and dab system is still most often used.

Other structures are constructed in a fashion similar to houses but with less care. Granaries, however, merit some discussion because building methods differ according to type. Those of a more permanent nature in which a threshed and winnowed grain crop is stored on a medium to long-term basis tend to be built of block. Others are built of mud packed over bamboo lattice, raffia or royal palm leaf mats, or mats of woven perennial grasses. Still others are simply bamboo lattice or mats with no

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mud covering at all. These are used for temporary grain storage, for drying purposes, or for medium term storage of shucked corn. It is essential to note that the permanent granaries are constructed up off the ground on either a stone or insect-and-fungus-resistant log base on top of which a special layer of split hard wood, cedar-like in its resistance and longevity, is laid before the granary itself is constructed. The elevation of the granary, the insect and rot resistant wood at its base, and the make-up of the plaster (essentially clay, sand and green cattle manure) which is smeared over the exterior and interior surface combine to make the granary a highly protective crop storage facility.

Mud blocks are often laid up to wall the compound, but in many instances the enclosure is formed by heavy branches or young trees which are cut and stuck in an excavated trench. This wood is also of a resistant nature. Corrals in which the cattle are penned during the growing season are built in the same fashion. In the Bafing Valley, they tend to be built closer into the village or concession than they would be in other parts of southern Mali in spite of the insect problem they bring. The reason is the threat that a fairly abundant population of lions pose to the stock. The corrals are often moved yearly to a new location and the former spot is an exceptionally fertile area for cultivation. The manure, of course, is gathered and spread on the fields farmed on an annual basis.

One can conclude that these people have developed a system which sustains them throughout the year as best they know how. It is neither rigid nor static. On the contrary, it appears to be flexible and accommodating to innovations which people believe will improve their lives.

Finally, it is important to stress once again that unlike in other areas of the Manding Plateau where few people dwell along water courses, the vast majority of people affected by the construction of the Manantali Dam are situated along the Bafing River. Although subjected to the dread affliction of river blindness, they have unlimited water resources and lands for cultivation and livestock grazing.

7.4.3 NEGATIVE EFFECTS OF THE DAM CONSTRUCTION AND

POPULATION RESETTLEMENT: WAYS TO MINIMIZE THESE EFFECTS

The construction of the dam will have both positive and negative affects, from short to long-term. What this analysis will focus on are the negative aspects that will hypothetically affect the population touched or forced to move by the artificial lake. These are what the project will seek to minimize. These negative factors will be material, economic, physical,

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psychological, and social: most of the people who must move will suffer losses in these realms. Note that these overlap and are simply set forth and categorized for illustrative purposes.

Materially, it is clear that families will lose their homesteads, that their traditional burying places and sacred locations will be flooded, and particular farm plots especially favored will be lost. The fertility built up in fields closest to the household will be lost. Family-owned trees will be cut down in the deforestation activity. Access to water for drinking, washing, cooking, gardens, and animals which is now virtually unrestricted will be severely reduced.

The income produced by both field and tree crops will be drastically diminished during and after the resettlement. Domesticated trees such as mango, orange, guava, lime, and grapefruit take several years to reach mature bearing age. These provide not only income in cash and kind to the family, but perhaps more importantly are a significant source of calories and vitamins during the so-called "hungry season" -- the time of the year from March to June when the temperature is the highest, the work is the most physically demanding, no gardens produce, family foodstocks are dwindling, and the subsequent harvest is still some time away. Indeed, tree produce is what keeps many children alive during this difficult time of year.

Because new fields will have to be cleared and sown, those most proximate to the household will be less fertile than is normally the case. A fertility regenerated from a fallow period will indeed be the case, yet yields from these areas will be lower than the lost fields would have produced. The same will be true of household gardens. These will be new plots lacking the fertility derived from household wastes that lost gardens would have. The main losers in this regard will be the women, for produce from these gardens provides not only ingredients for the sauces which accompany the staple grains but surplus for barter or sale as well. Until such new gardens begin to produce, the household will have to buy sauce items or the women will be obliged to gather wild edibles.

By the same token, the requirements of the move will likely mean that women will be restricted in their dry season pursuits of gathering firewood to stock for the rainy months, harvesting the produce of the shea, ronier palm, locust bean, kapok, baobab, and the many fruit trees, exploiting ponds for fish, and panning gold. The tree harvests in particular are highly important, for the shea nut provides much of the family cooking oil, the locust bean provides a major dietary ingredient higher per unit in protein than even the peanut, the palm sets forth an edible root similar to a bamboo shoot, others provide bulk in the form of processed leave, stamen, or pulp which goes into the sauces. All such foodstuffs are gathered and processed mainly in the dry

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months of the year. Since most hands, male and female, will have to direct their energies toward the resettlement, these important dietary complements will be lost for at least the season of the move.

The influx of workers for the dam construction has created a consumers' market for the local population that formerly did not exist. This will last for some six years. Grains, legumes, poultry, meat, and fish as well as other necessities such as spices and firewood, are in demand and local prices have increased. Part of this demand is being met by the local population, part being met by outsiders, particularly cattle merchants and butchers, but in any case the cash income of the local population has increased. This bonanza will be curtailed during the time necessary to engineer the village transfer. Farmers will not be able to supply this market because they will be moving their families and reestablishing their households. (Note that upstream villages as far as thirty kilometers away are now supplying the construction camp market). This will mean some economic loss.

The wild game population of the Bafing Valley will decrease. Already, construction workers using modern hunting arms go off into the bush in pursuit of game, mainly the hartebeest, roan antelope, and lesser antelopes. Such animals are traditionally hunted for both the meat they provide to the family diet and the income produced through sale or barter in cash or kind. The loss here will be permanent, and nutritional as well as economic.

At the same time that the nutritional well-being of the family will suffer, the requirements for demanding physical labor will increase. Dwellings, granaries, reception vestibules, latrines, chicken houses, household fences, and corrals will have to be built. New fields will have to be cleared and gardens started. No doubt, shallow surface wells will be dug.

Villagers traditionally allocate use rights to land to families who need and can adequately exploit a specific area. This process is performed by the council of village elders, the hereditary village chief, and the oldest living descendant of the original settler family. Certainly in the past this has been accomplished in either a peaceful or bloody fashion, depending on the era. In this instance it will likely be accomplished in a non-violent manner but it is likely that great amounts of social tension will be generated in the allocative process and that such tension may be long-lasting in nature.

New village sites will be chosen (by project management and outsiders) essentially according to quality of local soils and water resources. Villagers themselves would choose sites according to many many more criteria. One of the most important of these would be determined by sacrifice and divination: that

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is, whether the ancestral spirits and other spiritual or material beings in which vital forces are believed to exist would deem the new site to be a propitious one. Rituals will be performed to diminish the psychological stress which will result from leaving ancestral locations, the sacred bush that is adjacent to every village, the forest and village shrines likewise there, the familiar comfort of the family concession, from losing the utilitarian knowledge of the micro-environment, and from the difficulty of rekindling the feeling of familiarity and well-being in brand new surroundings. Research has informed us that the psychological stress that accompanies resettlement is usually more severe than any other kinds of loss. Thus, the project will particularly address this problem, mainly through seeking to involve the population to the greatest extent possible in the planning and execution of their resettlement.

Beyond the uncommon psychological stress that villagers will undergo, physical health can be expected to deteriorate. The Health Analysis (Section 7.7) discusses the problems of onchocerciasis, bilharzia, and lesser diseases. It is expected that drugs, alcohol, and venereal diseases spread by prostitution will also take a toll. The long term impact of the spread of these modern vices may not be measurable, but will nevertheless be important. Such has been the case at Selingue where youngsters, having experienced wage employment and the high life this brought have refused to return to family and farm. Concomitantly, the necessity of sustaining such new lifestyles brought about a significant local increase in theft, particularly of livestock.

Prices have already risen in the Bafing Valley and as far away as Mahina. Those residents who will not be able to take advantage of marketing opportunities afforded by the influx of construction and service personnel will see their own purchasing power curtailed.

One can assume that the traditional social structure and the ties that bind members of the extended family and those allied through clan, lineage, marital alliances, or longstanding service relationships will be strained.

7.4.4 BENEFITS

It is acknowledged that there will be certain positive affects of the resettlement effort. Benefits derived from the project will include cash income earned by villagers employed by the organizations that will execute the several activities. There will be possibilities for employment to assist with field clearing, clearing or otherwise improving motorways, blockmaking, the construction of project offices and buildings, and the construction of village housing. In addition, there will be the opportunity to earn cash through the provision of bamboo and

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grass for roof construction.

The platting of the new villages will offer the chance to regroup families that in existing villages have been obliged to settle apart because of increasing numbers. The platting will likewise offer villagers the opportunity to plan for future family growth by including enough space in the new concession for additional house construction.

Properly built, the new houses constructed of compressed block will be sturdier and will require less annual maintenance than current structures do.

Those villages settling adjacent of the new access road will have significantly greater opportunities to market their farm produce, firewood, hand-made implements or objects, and foodstuffs gathered in the wild. They will have direct transport links to the railhead at Mahina and it can be assumed that the regular traffic, now common but heretofore non-existent, will continue after the dam is completed.

The villages that must move to the east from the Tondidji area closer to Kita will find road links to Kita, their normal center for commerce and social services, much improved. It is also likely that the commercial exploitation of the lake for fish will take place, at least in part, from this location.

Social infrastructure and government services will be vastly improved at New Bamafele. A new school, a dispensary, maternity clinic, pharmacy, veterinary and forestry posts, grain storage warehousing, the agricultural extension office, and offices of the Ministry of the Interior will replace the existing minimal structures to be flooded. The location of New Bamafele will facilitate access to these services for a greater number of people.

The downstream irrigation potential created by the dam is estimated at several thousand hectares. A European consulting firm, TECHITAL, has already conducted a feasibility study which identified three thousand hectares immediately downstream on both banks. Villages that resettle downstream will be able to take advantage of such irrigation opportunities that are realized.

We have noted that permanent marketing access will be facilitated by the improved road infrastructure. One must also acknowledge the large consumer market, both African and European, that is presently offered at the dam construction site, albeit it is only a temporary one. Nonetheless, all sorts of foodstuffs, including meat on the hoof, are in demand and local prices have substantially increased. While outsiders bringing in imported goods are exploiting this market, local people are also benefitting from the demand.

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Further, a limited demand for services at the construction site has been created and local people are being employed as laborers, watchmen, and gardeners.

Finally, it can be assumed that exposure to modern technology brought by the dam will have a long-term beneficial impact, if only the provision of knowledge that alternatives exist and that other choices, however limited they may be, affecting family well-being can be made.

7.4.5 PARTICIPATION/MOTIVATION

People who will be forced to move by the flood waters have been much involved in resettlement planning to date. Starting with the sociological study in 1977 villagers who will be displaced have been constantly consulted in the planning process. This has included two AID/GRM missions in late 1981 and early 1982 which resulted in the Project Identification Document and a number of missions subsequently carried out by both AID and the GRM.

Since the naming of a Malian government resettlement coordinator (1982) and the constitution of a Project Resettlement Unit (early 1983), villagers or their representatives have been constantly consulted during the design phase in preparation for finalizing a Project Plan. Their concerns have been incorporated in the project design.

Communications between local government authorities and project planners were established early and are excellent. Local officials likewise seek to minimize the disruption of the lives of the Bafing Valley residents. More than project planners, these officials are fully aware of the social and political tensions that may be generated by the dam construction and resettlement. Local administrators' collaboration with AID and GRM project personnel has been highly productive, particularly during the process of final site selection in which the help of the head government official in the administrative circumscription of Bamafele was essential.

This collaboration and communication must continue and the project will seek to ensure this by creating three sorts of vresettlement committees.

The first, the Project Liaison and Adjudication Committee, will be composed of one representative from each village to be resettled, the project director, his American counterpart, the USAID project officer, the chief of the Division of Social Support and Monitoring, the chief of the Division of Technical Control, and the chief of the local arrondissement. This committee will approve the RPU work plan and coordinate the overall resettlement effort and the sub-activities, and, through

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the village representatives, provide advance notice to the villagers of tasks planned for each phase of the project. This committee will also function as a grievance committee to hear any claims of inadequate performance by contractors executing sub-activities, to resolve any inter-village disputes over land or water resources which may arise, to address any claims of insufficient compensation for trees or above-standard housing, and to resolve any other disputes or grievances which cannot be settled at the village level.

The chairman of this committee will be the chief local administrative official (the chef de l'arrondissement). The vice-chairman should be selected by the village representatives from among themselves. It is expected that this committee should meet at the arrondissement headquarters of Bamafele every six months or more as needed and jointly so decided. A small honorarium of perhaps 2,000 MF should be paid to each village representative on the occasion of each meeting to cover transportation or other expenses.

The second type of resettlement committee will be a local unit composed of project representatives and villagers from each resettling village. Specifically, this committee will be called the Village/Project Coordinating Committee. The Project Management will be represented by one of the contract community agents. The agent will act as the permanent on-site liaison between the village, the project management unit, and activity contractors. The village will be represented by its own citizens. The make-up of the village representation should be self-defined but will most likely reflect the existing traditional decision-making structure. This committee will meet as often as jointly agreed but no less often than once a month. Initial meetings should be held at the existing villages until activities begin at the new village sites. Thereafter meetings should be held at those locations. The village population should be made aware of the necessity of having a committee presence at the new sites and thus constitute its membership accordingly.

The contract community development agents will have to coordinate with more than one village in most instances. Their assignments to the villages should reflect the resettlement sites plans in that the agent should work with villages clustered at a specific site.

The duties of this committee will be to coordinate resettlement activity at the local level, including approving site platting for concessions and fields, assisting in the baseline census of families and their possessions, facilitating the distribution of food, coordinating financial compensation for trees or above-standard housing, overseeing the reestablishment of village orchards and shade trees, coordinating construction of granaries, latrines, fences, and such and therefore facilitating the

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allocation of materials for this purpose. The committee will plan and coordinate the transfer of the village population and its possessions from the old site to the new. There will no doubt be many other such duties defined by the committee itself which will aid the resettlement effort. It is expected that the chairman of this committee will be the village chief or his designee with the project agent serving as vice-chairman

A third committee will be formed to represent village women and assure that their opinions and desires are also represented in decision-making. The female sociologist in the RPU will organize and coordinate this group.

With the constitution of these three committees, participation of the local population in all phases of the resettlement should be assured. However, project management will have to take care that no special interests dominate any of the committees to the detriment of the powerless. In this regard, the interests of women and children may require special attention.

Seeking the full participation of the direct beneficiaries should motivate them to seek to accomplish project tasks as jointly planned and defined, for it will be in their interests to do so.

The motivation of Malian government project personnel and contract personnel to accomplish project goal must also be addressed. The project will seek to assure the full collaboration of project personnel through financial and material compensation. In the case of senior personnel, the project will provide basic housing, furnishings, and utilities at no cost. For contract personnel, allowances for local housing will be provided. All government project personnel will be provided with comfortable office space and the material means to do their work. Transportation will be provided to both government and contract personnel. Finally, various allowances will be provided to compensate personnel for the high local food prices, the remoteness of the project site, the long hours outside of the regular working day that this project will require, and the large difference between local wages, based on the Senegalese government salary scale, and those earned by Malian personnel.

7.4.6 ISSUES

There are several issues which this section will discuss, including those which the project design team have attempted address.

SETTLER LOSSES: The project will seek to minimize the cash losses which will be incurred by the settlers. It will accomplish this by financing monetary compensation for such losses as tree crops, improved housing, and others as may be identified by project personnel or the coordinating committees.

PHYSICAL DEMANDS: The project will seek to minimize the demand for physical labor on villagers, This project will require

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extraordinary amounts of labor to make bricks, collect and deliver other construction materials, rebuild structures, clear and establish new fields and gardens, and move people and personal belongings. The project will finance paid labor to accomplish all brickmaking, government building construction, field clearing, the construction of rural tracks, the provision of village wells, the reconstruction of village housing and other structures, and the stocking and distribution of food supplies. Villagers will be asked only to reconstruct structures such as mosques, granaries, latrines, fences, corrals, and chicken houses. Construction materials will be provided to do this. Although much of the villagers' labor will be expended in the rebuilding effort, some should nonetheless be available for the preparation of new fields for cultivation.

NUTRITIONAL DEFICIENCIES: The project will distribute food aid provided by the World Food Program to all families displaced by the retinue or whose fields may be flooded.

As mentioned above much labor will be required to build the new family concessions. It is also recognized that farmers may likely try to cultivate their old fields and at the same time establish new fields at the resettlement sites. Experience with other resettlement efforts have shown that family nutrition suffers as new fields must be cultivated. It is believed that harvests will be insufficient to provide for all the nutritional needs of the family. For this reason, and as additional compensation for the forced resettlement, full WFP food rations will be furnished to each family on a per capita basis over two years.

NEEDS OF WOMEN: Women are likely to suffer both physically and economically. In the former situation, the extraordinary demand for physical labor, potential decreased family nutrition, and the psychological stress of the move will likely affect pregnant and nursing women in particular but all other women as well. In the latter case, the loss of concession or other vegetable gardens and their own cultivated fields will result in economic loss to women. Infants and young children will personally experience such losses through diminished nutrition. It is therefore essential that women's gardens be reestablished as early as possible and that, in particular, fencing materials be provided for this purpose. Note that in seeking to pay special attention to the needs and concerns of women the project Division of Social Support and Monitoring has recruited a female professional as one of its two senior staff members. This person was the chief of the social affairs team which directed the Selingue resettlement.

EMPLOYMENT: The project will seek to ensure that resettling village males get first crack at salaried employment opportunities which will be available with project contractors.

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This will reduce the inequity that would arise wherein all the village males would be required to participate in the construction and transfer by providing voluntary labor while outsiders would benefit from being paid to make bricks, build houses, or clear fields. The same will hold true for the purchase of materials such as bamboo and thatch. Resettling villagers will be encouraged to supply these materials to the housing construction contractor for cash purchase. To the extent that villagers cannot supply labor or materials for cash payment, outsiders will be encouraged to do so.

PROJECT PERSONNEL BENEFITS: The project must attract competent and dedicated personnel to its staff to oversee the resettlement effort. Thus, project funding will compensate Malian civil service personnel for the disparity between their salaries and wages paid at the project site.

In this regard, it is worth noting that OMVS and contractor personnel wages at Manantali are based on Senegalese standards. Were the resettlement project to be a regional (with the OMVS) rather than a bilateral (with the GRM) one, its personnel would be remunerated at the same rate as OMVS employees of comparable education, experience, and responsibility. Samples of these wages are as follows:

Chief OMVS Rep	6,524,512 MF	--annual salary
	1,080,000 MF	--indemnity for responsibility
	1,980,000 MF	--indemnity for location
	222,416 MF	--family allowance
OMVS Coordinator	5,059,416 MF	--annual salary
for Deforestation	600,000 MF	--indemnity for responsibility
and Resettlement	1,584,000 MF	--indemnity for location
	324,624 MF	--family allowance
Draftsman	2,085,504 MF	--annual salary (173,792/mo)
Secretary	1,261,152 MF	--annual salary (105,096/mo)
Driver	1,064,160 MF	--annual salary (88,680/mo)
Janitor/Laborer	751,536 MF	--annual salary (62,628/mo)

By comparison, a Malian civil servant with a university degree earns a starting salary of some 80,000 MF per month, or less than an OMVS-employed driver and not a whole lot more than the least skilled laborer or guard at the project site. Under these wage scales, a secretary for the OMVS at Manantali would be likely to

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earn more than the resettlement project director paid at official Malian government rates.

The project designers have sought to minimize this inequity by budgeting various allowances for project personnel, both civil service and contract support employees. They will thus receive hardship and cost-of-living allowances of, respectively, 50% and 25% of monthly base salary. Civil service employees attached to the Resettlement Project Unit (RPU) at Manantali will also receive 75% of monthly base salary as a work demands allowance in recognition of the long hours that working in this project will require. Contract support employees will receive a monthly housing allowance to locate and pay for their own lodging. This is in lieu of being provided lodging by the project, which would require much more construction of housing destined for use only during the project.

AVAILABILITY OF SUFFICIENT LAND: The project area has a population density of less than 5 persons/k². Many villages are now settled in locations in the river valley where cultivable land extends only to the frontiers of the valley, that is, the hills and cliffs. They will be relocated in areas having much more cultivable land than is now the case. Further, the tradition of establishing farming hamlets remains strong. It is expected that villagers will continue this practice and establish new hamlets as well as retaining current ones at sites that will not be flooded by the reservoir.

Cattle are relatively few in the project area. Their numbers tend to be restricted by the prevalence of the tsetse fly that transmits bovine trypanosomiasis even though local breeds, both Moren and Ndama, are trypano-resistant. Even in very dry years, few humped-back Zebu transhume the project area because of the trypanosomiasis threat and other insect-transmitted diseases. Local cattle will continue to graze extensively as has been the practice and pasturage in sufficient quantity should be available. Should this not be the case, it will result from ill-timed or overly extensive burning of the bush and not from an insufficient amount of land for grazing.

AVAILABILITY OF LAND COMPARABLE TO WHAT WILL BE ABANDONED: In the short run at least, the land to which people will move will not be as fertile as that which they leave. This is recognized by all. The reason is mainly because villagers have built up residual fertility on house fields and gardens they have cultivated on an annual basis. Over the long term, it is believed that the old and new areas are of similar quality and potential. Indeed, many of the locations to which villages will move are or at one time have been their farming hamlets.

AVAILABILITY OF SUFFICIENT LABOR: It will be project policy to accord settlers priority for employment by the various

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contractors which execute project activities. Should there prove to be an insufficient amount of labor available, it is believed that one radio advertisement would flood the zone with people seeking work. Jobs are in short supply in Mali and the possibility of landing salaried employment at Manantali has already resulted in a huge over supply of labor at the dam site.

7.4.7 THE DIVISION OF SOCIAL SUPPORT AND MONITORING (DSSM)

It is clear that the resettlement activity can be technically accomplished in such a fashion as to fulfill AID's commitment to the government of Mali and the tri-state Senegal River Basin Development Organization. However, aware as it is of the results of past population resettlement efforts and potential problems that may arise, USAID seeks not only to technically achieve the movement of people to their new homes but to minimize the material, economic, social, physical, and psychological losses that might occur. To this end the Project Resettlement Unit will include a division which duties will include conducting or coordinating any and all special studies deemed necessary, performing the on-going monitoring (in concert with other divisions) to ensure that the resettlement activity is proceeding as planned, providing certain forms of support to the resettlement population, and overseeing or coordinating specific sub-activities. It is envisioned that this division, referred to as that of Social Support and Monitoring (DSSM) will be composed of two sections, that of Special Studies and Monitoring, and that of Population Support.

The section of Special Studies and Monitoring will be charged with the following tasks:

- Establishing the terms of reference, letting, and administering a contract with the GRM Institute of Social Science (Institut des Sciences Humaines) to execute a survey, to identify and inventory existing archaeological sites and the area to be flooded so that those identified as especially important might be studied before the retinue fills. This survey should be undertaken as soon as possible after project financing is granted by USAID/Washington and completed by mid dry season 1984-85. The research is expected to take 3-4 months. (Subsequent intensive study of any particularly site(s) will have to be supported by another donor, e.g., UNESCO).

Establishing the terms of reference, letting and administering a contract, preferably with a local Malian consulting firm to conduct a special study to update and refine information generally provided in the 1983 IER study financed by the UNDP. This new investigation will census villages concession by concession to determine exactly how many persons are residents and thus will be moved and entitled to food aid, as well as the extent, nature, and quantity of their personal belongings. This

study should be undertaken and completed in two months during the dry season 1984-85. (See Project Monitoring Analysis, Section 7.8.).

- Establishing the terms of reference for the epidemiological, nutritional status (height, weight, upper arm measurement) study to be executed by personnel of the National Public Health Institute. The DSSM will call upon short-term technical assistance to elaborate the TOR. The project will also finance necessary technical assistance, equipment, and other survey costs. This study will be coordinated by the Mananatali Resettlement Project but subsequent follow-up should be provided by the Institute.

Identifying the verifiable indicators by which project progress can be measured, define and establish the means by which social tracking can be done. It is assumed that routine monitoring can be done by the contract community development agents in conjunction with member(s) of the Village/Project Coordinating Committees. For extraordinary monitoring, special interviewers or researchers should be hired on a short-term basis. (See Project Monitoring, Section 7.8.).

- Establishing the terms of reference and administer contracts for any special or in-depth studies deemed essential.

- Drawing up the terms of reference for a mid-term evaluation to be conducted in late May and June of 1986, at which time progress to date will be measured and special problems identified and solutions proposed.

- Defining the team make-up and draw up the terms of reference for a final evaluation to be conducted in January of 1988.

The section of Population Support will be charged with:

- Constituting the Project Liaison and Adjudication Committee. This will be done in concert with villagers and administrative authorities (as discussed in the section on PARTICIPATION) in CY 1984.

- Constituting the Village/Project Coordinating Committees. (See PARTICIPATION). This should also be done in CY 1984 as early as possible.

- Planning and executing an orientation visit to Selingue of all members of the Project Liaison and Adjudication Committee. This activity should be coordinated with and aided by the branch project office based in Bamako and the administration at Selingue.

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- Facilitating the necessary liaison and communication between the Village/Project Coordinating Committee and the contractor organizations which execute project sub-activities such as construction and clearing.

- With V/PCC, examining and accepting, or suggesting changes in, the plats for villagers and fields (to be overseen by the Malian National Office of Urbanism and Construction but contracted to a private firm under UNDP financing) for implementation of the new site plans.

- With V/PCC or delegates, and a representative of the GRM Office of Waters and Forests, planning and overseeing the identification of trees to be removed from new village and field sites by contractor.

- With V/PCC and contract organization, ensuring the provision of fence, fire, and wood for other purposes as granary or latrine construction to village concessions.

- Coordinating reception of WFP food at Mahina and transport by contractor to new village site storage facilities.

- Distributing (including storage, inventory, accounting) of WFP food aid to eligible families.

- With representatives of GRM Waters and Forests, coordinating creation of a nursery for fruit and shade trees at New Bamafele.

- Determining and providing cash compensation for productive fruit trees, above-standard housing, or other losses to heads of extended family households (or as otherwise suggested by PLAC or V/PCC members).

- Distributing seed (including vegetable seeds to women) and tools for cultivating and clearing as necessary.

- With the other PRU divisions and ~~two~~ committees, jointly planning, coordinating, and overseeing engagement of contract truckers and transfer of people and personal belongings to new village sites.

Two senior Malian staff members will be needed to run the Division of Social Support. Both of these should have academic training, preferably in development anthropology or development-oriented rural sociology. One of these, the division chief, should have at least a Master's degree. Further, one of these two staff members should be a woman, and thus able to devote particular attention to the problems of women and children. These two senior staff members should generally divide their responsibilities, each overseeing to the tasks of the two

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sections. However, since it is intended that short-term technical assistance be provided to the Special Studies and Monitoring Section to help with the elaboration of terms of reference and the analyses of studies, most of the senior staff energies will be devoted to the Population Support Section.

In addition, the division should employ two experienced contract community development agents. It is suggested that these have at least a high school education. These experienced agents will be based at project headquarters but oversee the field activities of other agents based at the new village sites. The field-based agents will be seven in number. All of these will likewise be contract personnel.

Six months of short-term technical assistance is foreseen as necessary to assist the Division of Social Support and Monitoring. The cooperative agreement between AID, Clark University, and the Institute for Development Anthropology should be exploited to provide this technical assistance.

The Division of Social Support and Monitoring will also have to draw heavily upon the resources and expertise of the RPU technical and administrative divisions to make this project work.

LAND TENURE

Will the settlers be assured of access and tenure to lands to which they move? Will the move engender conflict between the settlers and people already living at the new sites?

Access and usufruct rights to crop and pasture land are among the Malinke granted by the village chief who exercises power over the area. He acts in concert with the so-called land chief, a descendant of those remembered as the first inhabitants of the area, and dispenses rights to land based on availability, family need, and family capacity to exploit the land.

It is important to note that the settler population will remain within its traditional area of influence. All village representatives voiced the need to settle at new sites within the limits of their traditional domain. Because of the essential homogeneity of clan and lineage in the project area and alliances based on blood or marriage, intervillage conflict over land availability or tenure should be minimal.

Most sites to which settlers will move have at one time been inhabited by ancestors or people from the village which has chosen the site. In some cases, particularly Zones I and Z (right and left banks immediately downstream of the dam), hamlets have been established by people from villages which will move there. In other instances the chosen sites are locations of former hamlets of the settling village. People moving into Zones III and IV are simply moving just east of the present locations. The sites they have selected are in areas they already farm.

Only in Zone II is there a host population which required consultations apart from traditional village communications and discussion on the resettlement. Although traditional ties exist between host villages and those wishing to relocate there, negotiations concluded on agreement determining what villages would settle adjacent to host villages--two in number--already there and what areas would be available for farming by the settlers.

Villages thus have chosen locations for the new villages with which they are environmentally familiar and to which they have traditional rights, or at the least, ties through allied clans or lineages. The design team expects that any land tenure conflicts which arise will be intravillage and will have to be resolved by village elders or, finally, by civil authorities.

One additional point merits discussion here. Why do so few people live in the chosen resettlement zones? The answer is, first, that population density is meager for two essential reasons in the entire project area. This results from 19th century warfare--interethnic, religious, and anti-colonial, disease vectors, and the shocking lack of health care available to people. Second, the areas to which people will move are at some distance from the present limits of the river.

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They are either currently formed by people from villages planning to resettle there or the land lies in fallows there is not a serious difference between the production potentialy of these lands and what people farm now. Were this the case, villagers would not have selected these sites for relocation.

7.5 ANNEX: ADMINISTRATIVE/INSTITUTIONAL ANALYSIS

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MANANTALI RESETTLEMENT PROJECT - THE
ROLE OF NATIONAL AND REGIONAL COMMITTEES
AND A PROPOSAL FOR THE DESIGN
OF THE RESETTLEMENT PROJECT UNIT

In preparing this report, documents available at USAID/Mali and from personal libraries of USAID staff on resettlement were reviewed. In collaboration with a representative from Service Hydraulique, an October 19-20*trip to Sélingué was undertaken to discuss that resettlement effort with remaining staff who were involved in planning and implementing it and with villagers in a few of the communities which were relocated. Both the staff at Autorité de Sélingué and village chiefs indicated that they would welcome the opportunity to discuss their experience with representatives from the Manantali area. Discussions were held with the UNDP and World Food Program representatives who supported the Sélingué resettlement and who will also be involved in the Manantali effort. Finally, a field trip to Mahina, Bafoulabé, Kita, the Manantali dam site and selected villages in the resettlement zone was undertaken from October 29* through November 4 where the Service Hydraulique representative and I met with villagers and fonctionnaires. Two engineers from USAID/Engineering assisted us on the trip and will be submitting a separate report.

A visit to Sélingué leaves me with a sobered understanding of the complexity of the resettlement task. A few days in the Manantali Area gives me a sense of the delicate balance which the resettling villages and their hosts are currently maintaining. On a good day, I have characterized the resettlement effort as it is currently conceptualized as a planned disaster relief effort. On a bad day, it seems to present the possibilities of a planned disaster.

The risks for errors which could have profound consequences for the affected population seem more visible and potentially more ubiquitous in a forced resettlement effort. Implementation of this project will require a clear understanding of what is to be done not only by the Malian agencies involved, and USAID and its contractors, but also by the people of the resettlement zone. Overpromising will exacerbate the inevitable sense of loss which will occur in any event.

This analysis and proposal were developed in the context of changing USAID/Bamako policies in host country contracting which would, by implication, change the role of host country agencies. At the same time, the Malian representative to the OMVS Council of Ministers had recently argued successfully in that forum that Malian national agencies and not the West African Regional OMVS, would be responsible for implementing the resettlement of Malians caused by the construction of the Manantali Dam. This report attempts to deal with both of these factors.

*1982

The resettlement process can be conceptualized in four stages which cover at least a generation in the lives of the resettled population:

1. Planning, initial infrastructure development and settler recruitment
2. Transition
3. Economic and social development
4. Handing over and incorporation with the regional economy.

The last two phases are thought to be crucial if living standards and production are to improve and development is to be sustained.

It has been noted that few technical, organizational or socio-political changes are adopted by settlers during the period of transition to their new sites. It is thus not advisable to attempt innovations during this period (1). Because the period proposed for this project is limited, AID/Washington has suggested that the project not attempt an economic development purpose (State 188239), the USAID supported effort, will thus be limited to stages one and two above.

The Manantali Resettlement Project Identification Document identified several committees and agencies which might have a substantial role in coordinating and implementing the Project. These include the following:

1. Resettlement Coordinating Committee
2. An Autonomous Project Management Unit
3. The National Committee of OMVS
4. OMVS Projet de Barrage de Manantali

The first three of these will be discussed in the section which follows. Next, more detailed analysis of the proposed project management unit will be discussed. Finally, three issues which emerged in the course of our field visits will be presented.

Regional and National Level Coordinating Bodies

The functions of an overall coordinating body can be viewed in three contexts:

1. its role in providing advice and a base of political support for the Malian representative to the regional OMVS Council of Ministers, the Minister of Energy and Mines;

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2. its role in making claims to and coordinating the timing and sharing of resources for implementation of the regional components of each of the projects (e.g. technical assistance managed at the regional level);
3. its role in coordinating the timing and sharing of resources for bilateral activities of each of the OMVS projects within Mali.

The existing coordinating body for OMVS activities in Mali is the Comité National de l'OMVS.

While all Ministries in Mali and their Directions are considered to be members of the Comité, there is no fixed individual representative from each of the member Ministries. Meetings are not held on a pre-set, periodic basis but rather are scheduled on an "as needed" basis in response to significant events, usually around issues of Mali's position in regard to OMVS Regional activities. The President of the Committee is the Directeur Général of Service Hydraulique, and the Director is the Minister of Energy and Mines who is permanent GRM representative to the Council of Ministers. It is thus through him that the Mali National Committee on OMVS formally submits its position to the regional OMVS Council of Ministers.

It is likely that this committee will be most useful in the first context noted above, and to some extent, in the second which involves relationships between the government of Mali and the Regional OMVS Council of Ministers. The role of this committee in coordinating the implementation of the regional activities of each of the OMVS projects will vary according to the project. Given the differences in activities to be undertaken by each of the four projects, this committee does not appear to be substantially important in the coordination of bilateral activities.

In the case of the Manantali Resettlement Project, it is not expected that the Committee will be significantly involved in regional or bilateral implementation. The coordination of resources and timing of activities from the regional level will be the function of the OMVS regional Projet de Barrage unit being established at the Manantali site. For bilateral implementation issues, the Comité de Recasement de Manantali is expected to be the forum for planning and resolving problems. These are discussed below.

Service Hydraulique has attempted to establish the Manantali Resettlement Committee to provide more systematic coordination of the bilateral components of the project. In February 1982, a letter was sent to the following agencies to request that they designate a permanent representative to the Committee: Ministre de la Santé, Eaux et Forêts, Institut d'Economie et de Recherche, Travaux Publics, Opération de

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Transport, Cartographie, et Institut National de Sciences Humaines. The first three mentioned above have responded and have designated representatives. This group has convened once for the purposes of reviewing the terms of reference for the UNDP supported studies. In the absence of substantive issues which require resolution and action, there is no à priori reason for this Committee to have become more active up to this point. It could serve as the forum for establishing the organizational relationships proposed for the Resettlement Project Unit.

It should be remembered that interministerial committees are only one of several types of organizational mechanisms which are available for formal coordination of projects involving complex interorganizational arrangements. The range of other possible coordinating mechanisms is presented in Table 1. It is likely that contracts and detailing of staff will be the principal forms used in this project, and those mechanisms do not require the frequent or regular participation of the full range of committee members.

The regionally supported Projet de Barrage will be more important in terms of regional coordination, and the Resettlement Management Unit will be the principal agency in coordinating and managing bilaterally supported activities. Both of these organizations will be newly created in response to the construction of the dam and its consequent resettlement.

It is anticipated that the principal activities requiring coordination with regional OMVS activities will be site specific. For instance, timing of the dam construction will affect existing access roads in the existing area; the deforestation and construction of roads to remove wood products should be planned in a manner which will both guarantee availability of materials for construction of new buildings and maximize utility of the roads for the transport requirements of the resettlement effort. OMVS is in the process of establishing a regionally supported organization on site in Manantali which will have responsibility for assuring the coordination of the timing and sharing of resources which are financed by different agencies involved in the area.

The Projet de Barrage de Manantali will have three divisions: Technical, Administrative, and Resettlement and Deforestation. The USAID-supported Project Management Unit will be under the Resettlement and Deforestation Division. The Projet de Barrage de Manantali will not, however, exercise financial control or direct management control over the activities of the resettlement project.

This structure is different from the organization which executed the Sélingué Dam construction and resettlement in several ways. First, it is for obvious reasons a regional body under the direction of OMVS. The Autorité d'Aménagement de Sélingué was a national project management unit which had direct

TABLE 1

ORGANIZATIONAL MECHANISMS TO INCREASE COORDINATION

	STAFF LEVEL	BENEFICIARY LEVEL
FORMAL MECHANISMS	<ul style="list-style-type: none"> • Interagency coordinating or advisory committees • Liaison office at port or central ministry • Interagency task force • Binding cooperative agreements • Loaning of personnel between agencies • Cost sharing • Joint training and orientation courses for agency personnel • Copies of reports sent to heads of other agencies • Fixed reimbursement agreements • Single report format used by two or more cooperating agencies • Existence of an independent monitoring and evaluation entity • Merging of agencies • Creation of an incentive system (financial, promotional, professional) to encourage working on joint projects 	<ul style="list-style-type: none"> • Beneficiary participation in decision making and/or monitoring of the project • Formal staff participation in beneficiary organization meetings • Orientation courses for beneficiaries • Requiring contribution by beneficiaries to project costs, e.g., labor, money, materials, etc. • Periodic public meetings of staff with the community
INFORMAL MECHANISMS	<ul style="list-style-type: none"> • Lending of resources (personnel, transport, etc.) by one agency to another on an informal basis • Use of informal information systems by decision makers • Encouragement of informal communication between agency staff (through inter-agency sports competition, weekend staff retreats, occasional seminars, etc.) • Having participant agency offices in the same location • Periodic meetings of agency decision makers on an informal basis • Staff participation in agency decision making • Use of a supportive management style by supervisors • Use of a bargaining strategy with external actors, rather than reliance on preset rules 	<ul style="list-style-type: none"> • Availability of staff in an office accessible to the beneficiaries (open on market days, for example) • Encouragement of agency personnel participation in beneficiary organizations (civic, social, religious, etc.) • Posting of project objectives, target dates, etc., where they can be viewed by beneficiaries • Conducting business and writing reports in the beneficiary dialect.

Source: Development Alternatives, Inc. Integrated Rural Development: Nine Critical Implementation Problems, Research Note No. 1, Washington, D.C.: February, 1981.

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responsibility for coordination with donors and issuing contracts for the work. The Projet de Barrage will not be responsible for actual negotiation of contracts.

Second, while not directly managed by the Projet de Barrage, the resettlement project is viewed as an integral part of its coordination effort. In the case of Sélingué, a special project unit for the Resettlement Studies was created separately from the AAS itself. As the time for inundation approached, a new unit was created for the construction of infrastructure and transition to new sites. The UNDP director who had headed up the Studies Unit was retained as the expatriate co-director in collaboration with a Malian co-director who had not been involved in the study phase. There was no systematic coordination between the study unit and the AAS which was responsible for the construction of the dam until the later stages of construction. Placing a division for resettlement within the overall Projet de Barrage of course does not guarantee that coordination of the resettlement process with other aspects of the dam construction will occur, but the decision to establish the division does seem to represent recognition on the part of the designers of the project organization that this is important. The detailed responsibilities of the staff of this unit have not been formally released. It is anticipated that the staff of this agency will include 2 Senegalese, 3 Malians, and 1 Mauritanian who will be stationed at Manantali. The Director of the Project is Garan KONARE, a Malian. We expect that the role of the Resettlement and Deforestation staff member will be limited to coordination and will not involve an active intervention in management of the project. The Chef de Projet de Barrage presented the same understanding of this role. However, the Minister of Energy and Mines should review these provisions and descriptions with OMVS to verify their agreement on this issue.

Organizing for the Planning Stage

The USAID project design process has provided much of the organizational basis for the planning substage to date. Service Hydraulique and USAID/Mali have contributed substantially to the planning effort during the preparation of the PID and the development of Scopes of Work for the technical analyses currently under way with UNDP support. The technical analysis effort will be followed by the preparation of the USAID supported Project Paper which will require analysis of the findings of the UNDP studies and possibly the conduct of some additional studies.

It should be noted that neither the Projet de Barrage nor the resettlement Project Unit will be operational during the initial study phase for the resettlement. The Service Hydraulique proposed early establishment of a formal organization which would be responsible for the planning phase. The greater part of the planning effort will have been completed before USAID funds are available for the support of an organizational unit, and OMVS Regional funds are apparently not currently available for this purpose.

Service Hydraulique is seeking funds from the UNDP to support a temporary planning unit which includes one ingénieur de génie civil as chef de projet, an additional civil engineer, and support staff including a chauffeur, secretary, and eventually a guard. This unit would monitor the studies being conducted under PNUD financed contracts, authorize payment of those contracts, and establish the structure required for subsequent USAID financed phases. The staff would thus basically be expected to collaborate with USAID in the Project Paper design process. Given the wide range of technical subjects covered in the UNDP financed planning studies, this staff should be supported by a technical group (other than those agencies which are conducting the studies) who can review the studies and advise the studies unit on details of the technical adequacy of each of the reports. Assuming the unit director will have had substantial experience in the project area, this staff would review the reports in terms of their adequacy in providing the required data to make decisions required for implementation of the project. Noticably lacking in the proposed staffing pattern is social science and agronomic expertise.

While the USAID project will probably not extend to the economic development stage of resettlement, there are some developmental activities which should not be ignored during the planning phase. Settler recruitment is obviously different in a compulsory scheme than in a voluntary scheme. Even with a compulsory scheme, however, decisions should be made as to whether inputs and assistance in relocation will be restricted to only those being involuntarily displaced (e.g. placing explicit restrictions on settlement by construction laborers who came into the area) and on mechanisms for establishing and regulating eligibility for assistance. This issue should be considered in the PP design process. (The importance of this issue can be seen at Sélinqué where one resettled village reported that laborers who had worked on construction of the dam had taken over some of the limited number of fields which had been cleared for them and the chef d'arrondissement had to intervene, requiring to leave after the current harvest. This village chief indicated that they had no objection to incorporating these newcomers into their village but that the existing procedures for this were controlled by the chef d'arrondissement via sale of land to the newcomers with none of the revenues being available to the village itself. Another village reported a continuing influx of new settlers which is stressing their already inadequate infrastructure. (I do not know whether settlement in this village has been regulated by sale of land or if these revenues would be made available for support of the villages' infrastructure). The type of land tenure for the settlers and their hosts should be validated during this planning phase and presumably will be undertaken in part during the PP design process and in part during the early months of the project. The planning phase should also include assessment of the settlement as a whole in relation to regional development and a proposal for the scope and scale of the farming systems

envisioned for the area, presumably assuming eventual agricultural intensification once the transition is complete (2). Presumably, these issues will be considered during the PP design process.

None of the organizations involved in implementation of the resettlement project contains an ongoing planning function to address planning for future development efforts in the area. If the GRM anticipates pursuing a long-term development effort in the resettlement area, some investment in the establishment of a planning capability will have to be made, but this would be done more appropriately at the level of the First Region if current plans for development of this function are implemented or at the OMVS regional level. It should be noted that the proposed USAID supported OMVS Integrated Development Project would include support for the development of a plan for the Senegal River Basin, including Mali's First Region.

Organizing for Initial Infrastructure Development and Transition to New Lands

The analysis of the focal organization for the implementation of the Manantali Resettlement Project will be limited to these functions and structures required to establish infrastructure and to accomplish the transition phase. There is no single agency currently in existence in the area which either directly provides for all the functions required for the relocation of people or for coordinating the expertise required. Thus it will be necessary to establish a project implementing unit. The bilateral responsibility for the project has been assigned to Service Hydraulique which is under the Ministry of Energy and Mines, and the Resettlement Project Unit will be under the Division Energie et Barrage of Service Hydraulique. The Resettlement Project Unit is one of several projects which are to be coordinated by Division Energie et Barrage of Service Hydraulique. Other activities under the Division Energie et Barrage include the Markala Dam, Energy Planning, and dams at Tossaye, Kénié and Labazanqa.

The approach used in the design of the RPU and assumptions about emerging USAID/Mali policies concerning implementation will be presented in the next section. Next, a set of tables which analyzes the goods and services, functions required and the roles of the Division Energie et Barrage, the Resettlement Project Unit and of USAID/Mali will be proposed. The organizational structure recently proposed by Service Hydraulique will be discussed in a later section and an alternative structure will be suggested for discussion between Service Hydraulique and USAID during the PP design process.

In developing a design for the Resettlement Project Unit, our approach was to begin with the goods and services and the functions which will be required to provide them during the life of the project. The listing is based on those indicated in the PID. The mechanisms which can be used to arrange for the

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provision of each of the direct and indirect goods and services will be noted. The type of expertise which would be required are indicated as well as the mechanisms by which that expertise may be made available for the project.

The strategy proposed in this analysis combines several of these mechanisms. Many of the goods and services to be provided under by the project are not currently directly produced or indirectly supported by Service Hydraulique which will have the lead responsibility for implementation. However, other governmental agencies in Mali and private firms and non-governmental organizations do have expertise and experience in the production and delivery of these goods and services. In addition, many of these functions are temporary and do not require long-term presence of a given expertise at the project site. Thus, heavy emphasis is given to contracting and interagency agreements with these entities as a mechanism for providing some direct and indirect services (3). On the other hand, many functions will require field staff with ongoing familiarity with the affected population and the terrain, and some of those functions which may be contracted out will require their support as well. For instance, allocation of land to village construction areas and to farming fields will require the temporary services of a soil scientist and an urbanist which can be arranged on a contractual basis; however, careful consultation with the settlers will be required, and an agent who is experienced in this process to provide this coordination and should thus be an ongoing employee of the Resettlement Project Unit. For instance, we propose investigating the possibility of seconding community agents from National Direction de la Coopération. It should be noted that the Project Identification Document envisioned the establishment of an autonomous project management unit which would be staffed by multidisciplinary specialist seconded from various GRM agencies responsible for resettlement. The proposal which follows departs from that plan in two respects. As indicated above, Service Hydraulique does not currently expect for the unit to be fully autonomous, and the **field** based unit will require some support from the Bamako-based division to which it is attached. Secondly, less emphasis is given to secondment of staff; staff is often most feasible when only the particular technical expertise of a given employee is needed and for a given period of time. Secondment, is often undertaken to increase control over the utilization of the borrowed expertise for a particular purpose, assuming that the home agency will not be pursuing the same activities with the same degree of emphasis. However, if it is actually a service, which implies that the home agency provides other supports such as equipment, supervision, and access to current technical information, which is actually needed and not simply a specific technical expertise, secondment may be less desirable. To provide the necessary continuity on site, however, a core of permanent staff would be seconded (see p.28), and an NGO would be contracted.

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Other coordinating mechanisms should be used to arrange for the needed expertise, and these are indicated in the charts which follow. For example, the use of an interagency agreement between Service Hydraulique, ODIPAC and Elevage may be a better mechanism for providing agricultural and livestock services which will be needed in the area of an ongoing basis than detailing those agents to the Resettlement Project Unit which would increase its management burden and where there will be insufficient capability to supervise the technical aspects of their job.

This analysis is based upon two assumptions regarding current USAID/Bamako policy which have substantial implications for the role and staffing of USAID/Bamako, Service Hydraulique and the Resettlement Project Unit. These assumptions are:

1. Contracts for technical assistance as well as construction will be made directly by USAID/Mali and no major host country contracts will be used.
2. Authorization for payment of all vouchers and for procurement orders will require the signature of a USAID authorized contractor in addition to those of the relevant Malian counterpart.

This proposal represents USAID/Bamako's position. Given the heavy use of contracting proposed in this analysis and the above assumptions, it will readily be seen that the arrangements which result from these assumptions will pose a substantial management responsibility for USAID/Bamako. Because Service Hydraulique has not worked directly and extensively with USAID in the actual implementation of projects, the substantial involvement of USAID in execution may be somewhat different than they have anticipated. It is expected that the implications of the above assumptions for project implementation arrangements will result in discussion between the Mission and the Ministry of Energy and Mines and eventual revision of the charts which follow.

In addition, cooperative discussion between USAID/Bamako and the Minister of Energy and Mines will be needed to be opened with ODIPAC, Direction National Cooperatives, Urbanism, the Ministries of Health and Education during the PP design phase to confirm or modify their involvement in the project. It is especially important that the long-term plans of these ministries for support to the resettled zone be clarified during these discussion. In addition availability of staff and responsibilities for salaries, benefits, housing and transport of seconded staff will have to be defined, and mechanisms for maintaining accountability of those funds will have to be established.

<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
Project Staff Facilities and Equipment	a Procurement of vehicles, ofc. equip, residential furnishings	SH reviews and approves procurement plan; Based on approved plan USAID Contractor procures all commodities with approval of USAID/Mgt Office; in accordance with USAID procurement regulations in Mali; RPU to retain inventory of all items		SH: Assuming Bamako as point of delivery for U.S. imports & point of origin for most local procurement. Receiving capability needed in Bamako; ability to contract for transport to Manantali needed in Bamako RPU: Inventory & receiving capability to verify condition of goods & completeness of shipment from Bamako. Preparation of procurement plan.	Assume no existing capability for this in SH or RPU; USAID Mgt must provide copies of all purchase orders & shipping documents to receiving unit either at SH in Bamako or on site in Manantali; otherwise completeness of shipment cannot be verified. USAID Mgt. should prepare procurement guidelines for host country procurement
	b Selection of location for housing & offices of Recasement Project Unit (RPU)	USAID & SH to negotiate with appropriate companies and private individuals to arrange for housing & office space for USAID contract & RPU staff on site			USAID & SH to clarify source of financing for on-site project facilities ASAP
	c Renovation of housing & offices for project staff in <u>resettlement area.</u>	USAID Mgt, PP team including SH specifies no. of housing units & TDY quarters. USAID contractor prepare plans for any necessary modifications and USAID approves		RPU assigns housing & office space SH participates in PP team & decisions on no. and locations of facilities	Assumes USAID financing for this; existing structures in the area will be used as much as possible.

SH = Service Hydraulique, Bamako
RPU = Resettlement Project Unit, Manantali

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<u>Goods or Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
	d Inspect work, review & authorize vouchers for payment of staff housing construction contracts	USAID Engineering, USAID Project Officer, RPU and SH		Support of USAID TDYers SH, RPU: Inspection of work	
E V A L U A T I O N and Monitoring	On-going monitoring and evaluation	Institution with experience in monitoring resettlement could provide resident on-site social scientist with additional recurrent consultancy support to set up studies and special evaluations and local hire agent, possibly from CDNC	Possible cooperative agreement between AID/WA & Clark Univ./Inst. for Dev. Anthropology funded by project evaluation funds	RPU: technical collaboration with IDA in setting up studies; review of IDA reports	Sec State 188239 directive from AID/WA requiring expertise in resettlement monitoring

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<u>Mode and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
J. S I T E S E L E C T I O N and L A N D P R E P A R A T I O N	a Analyze PNUD studies to determine feasibility of new sites chosen by each village according to their water supply, agro-economic & social preferences of settlers & the relevant host populations	American & Malian PP design team, including forage & livestock expertise, hydrologist, forestry, agronomist, engineer, soil scientist, and anthropologist	Institute for Development Anthropology, could use S&T/MD Coop Agreement on Area Development	Staff of studies phase to collaborate; SH senior staff to participate in initial briefings & periodic meetings during design phase including at least one on-site visit	1. Issue of USAID support for schools & health services to be clarified ASAP as amalgamation of village based on assumption of additional services with USAID support 2. Will USAID/Bamako pay per diem of Malian PP design team members? 3. Could IDS be brought in here to start baseline work?
	b Verify the exact domain of each village	USAID Contract team and RPU consult with village groups (dry season, 1983-84).	USAID Contract; CNDC would be seconded to RPU to assist with housing & public structures; discussions should be held with ODIPAC re: their collaboration under contract to assist with plans for farmers' fields	RPU: identification of Malian experts to participate in team SH: approval of inter-agency agreements to participate in team	Determine if former CNDC Selingue agents should/could be used & availability of ODIPAC agents who appear to be currently without job definition; ODIPAC agents <u>not</u> detailed but work plans developed jointly by ODIPAC & RPU

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<u>Needs and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
continued	c Confirmation of new village sites with relevant <u>Commandants de cercles</u> and other administrative and political authorities	Chef de RPU, SH	Meetings, letters	RPU: Liaison with local authorities; understanding of jurisdictions and local issues SH: to support RPU in raising issues at National level, if needed for timely resolution of problems if solutions are not made at subnational level	See pg. of this report
	d Specification of village sites and farm land areas; including women's fields	Soil scientist and urbanist in collaboration with village group; RPU agri. staff to coordinate technical team and farmers and work with socio-scientist; coordinated with Eaux et Forêt agent (below).		RPU and villagers identify precise areas requiring clearing for village and fields.	Note substantial role of women in this area in agriculture; Selingue planners failed to reestablish plots for women, resulting in loss of vegetable inputs in diet
	e Designation of trees to be cleared for village construction and clearing of fields	Permits from Eaux et Forets required, consultation with village Chief & Chef de Poste coordinated by RPU, (possibly including ODIPAC agents); RPU, SH, USAID Project Officer, Forestry Officer, Mgt. to review sub-contract prepared by institutional contractor.	Interagency agreement or contract with Eaux et Forets to produce plan for trees to be retained in coordination with RPU	RPU: field agent & senior staff liaison with Eaux et Forets; transportation for Eaux et Forêts agent	

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
3 continued	f establishment and operation of nursery, including introduction of improved fruit trees; policy on sale/free distribution to settlers & for host population	One nursery manager with possible support of Peace Corps forestry agent	USAID contract with Eaux et Forets with support for agent in lieu of fee collection for violations in the area; policy by RPU with consultation of USAID Forestry & Eaux et Forets	RPU: analysis of Forestry situation and familiarity with local villages to establish policy; liaison with Eaux et Forets	USAID has successful experience in contracting directly with Eaux et Forets for this type of program; Note: funding for this component may be available thru USAID Village Reforestation Project
	g Clearing land for villages & fields	USAID contractor will sub-contract with land clearing firm; RPU & USAID approve sub-contract	USAID Contract with land clearing firm; contract to include clause on preferment for hiring resettlement villagers		Assumptions on local labor availability should be examined in PP stage

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
4. R O A D S and P I S T E S	a Identifica- tion of pur- pose of road (e.g. evac- uation of population only, market access road	Chef de RPU and USAID project officer - USAID contractor to arrange transportation study, subcontract which will be approved by RPU and USAID	Short-term sub-contract with consultant to do trans- portation study	Chef de RPU who has familiarity with local conditions	
	b Identifica- tion of type of road required and of site	USAID/Contractor provides Topographer to specify ter- rain constraints and engineer to specify construc- tion sites and materials and equipment requirements	USAID con- tract with Travaux Public	Chef de RPU who has familiarity with local conditions	Are there complete maps of Manantali? If so, will a topographer be required?
	c Construction of roads - in coordina- tion with deforestation if feasible	USAID Engineering to set cri- teria & specifications for bidding, to identify firms for bidding list, to review technical proposals USAID Management to review cost proposals in concert with RPU.	USAID con- tract with construction subcontract firm; sub- contract approved by RPU & USAID	RPU: review and approval of construction subcontract criteria and contract documents	1. Will fores- try roads be primarily the existing ODIPA pistes towards Kita? 2. Consider deforestation or dam con- tractor as possible source & consider requesting Code 935 nationality of supplier waiver for-935 procurement & site source procurement authorization 3. See OMM - Travaux Neuf contract for possible format

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
continued	d on site monitoring of road construction	USAID Contractor & RPU		Monitoring road construction progress	Frequent (i.e. 1 per month) visits to project site periodic payments to be made
	e review and authorization payment	USAID Project Officer and Engineer			
5. WATER SUPPLY	a Identification of specific water points in each village and specification of type of well*	SH,RPU,USAID Mgt., Eng. & Project Officer develop contract & final review report for seismic studies of small areas by reputable geological firm or test drilling for locate sites for hand dug wells; CNDC agent to coordinate contact with villages	USAID Contract	RPU; USAID liaison; supervision of CNDC agent; coordination with team noted in 3 d above	Fred Kroll may be helpful in identifying geological firms for the Sahel; Mali Aqua Viva may be able to do test drilling; special effort should be made to consult directly with women on location & number of wells as they may be the principal users
	b Construction of wells	Local labor coordinated and managed by NGO or drilled well construction team; USAID Contractor develops subcontract; USAID Eng., Mgt., & Proj. Ofc. contract & RPU & SH approves subcontract	USAID subcontract with NGO with experience in wells in Mali	RPU; Liaison with contractor, USAID NGO (e.g. CARE)	Manpower analysis may be needed to determine availability & willingness of local labor to participate
<p>*While the PID design team found that few villages want pump operated wells, one village indicated a strong preference for a pump operated well and would be willing to cost share with the project to get it. Visited in our Mission the process for negotiating, village responsibility, installing the well, the training in water use which will be established by the World Bank Health Project in the First Region could be adopted for those villages which want pump operated wells. Construction contractor for these village wells may be different from those with simple wells.</p>					

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
5 continued	c Routine inspection of work	USAID Contractor and RPU		Inspection of work progress	
	d final inspection of work & authorization of vouchers for payment of well construction	USAID Project Officer and Engineer and RPU		RPU, SH verification of completion of work	
6. H O U S I N G and P U B L I C A R E A S	a Establishment of precise policy & budget on what structures will be replaced with USAID financing; mechanism for determining how many hectares of land will be cleared for fields & for village location; what public structures will be replaced; what trees & orchards will be replaced; also exact method of calculating value of each, method of reimbursing losses or reconstructing lost structures	Chef of RPU, USAID Design Officer &/or Project Officer with technical consultation from USAID Engineering	Possible short-term use of Cooperative Agreement with Institute for Development Anthropology to do policy analysis during Project Paper design	RPU: familiarity with local conditions; liaison with USAID SH; review and approval of policy and budget	Policy Analysis Paper should be prepared developing alternative decision rules and scenarios of consequences for different groups or individuals; this would provide basis for discussion by the team

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
6 continued	b updated inventory of all individuals & structures by menage which will be replaced by the project and verification with Chef de menage of exact number, size and indication of what structures will not be replaced; materials which can be moved identified	RPU Monitoring Unit under USAID Cooperative Agreement with IDA	USAID Cooperative agreement with IDA		Note: local head taxes make it difficult to get accurate counts; a written report on each menage should be prepared & submitted to village chief (even if illiterate) and the RPU cartes de famille should be validated
	c verification of public buildings and places to be replaced with USAID support	Chef of RI village with Chef de		RPU; working relationship with local leaders SH: review & approval of plan and budget	1. Palabre materials can be moved in some cases 2. Policy on schools & clinics to be explained to village

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
6 continued	d Sensitization of population on program for protecting and purchasing paille and bamboo	Policy on purchase of locally collected materials set by Chef of RPU with technical consultation by NGO, explained to villagers by RPU agent in collaboration with village chef de poste	Detail of DNC agents; USAID contract with NGO	RPU: supervision of CNDC agents in coordination with NGO	Bamboo campaign to start two years before houses moved Note prohibition on burning
	e Purchase, storage, and transport of materials for construction of housing and public buildings	With RPU coordination, NGO to construct hangers for storage at each new site, purchase & transport materials USAID Engineering, Project Officer, and Management to approve contract	USAID contract with NGO	RPU: Coordination of Timing and Locations	Priority for labor recruitment will be given to resettlement villages
	f Installation of brick presses and training of locally selected masonry teams	RPU, USAID Engineering & Project Officer or PP design team to determine numbers of masons, number of presses, and size & number of local teams needed; RPU agent to work with villages in selecting training participants and local labor teams	DNC agent detailed to RPU; USAID contractor subcontracts with Urbanism or NGO for training; USAID & RPU approves subcontract	RPU: supervisory of CNDC agents; coordination & programming of schedule for work with NGO	Contact Urbanism; World Bank is developing their capability in masonry training to construct health centers in Region one. Their capacity to meet WB & AID project needs at same time should be determined; PP team to assess local labor availability

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
e continued	g Supervision of village construction and transport of work team to view sites	RPU coordinates with NGO to hire & transport local workers and supervise work sites; temporary work camps to be established initially.	USAID contract with NGO	Same as above	Traditional local youth groups include men & women; provision for reimbursement of all workers should be made & for planning of food requirements to include women's groups
7. F O O D S U P P L Y	a Establishment of policy on food distribution during construction phase and policies on food distribution during resettlement phase (e.g. food for work only at new sites during construction, etc.)	World Food Program, Chef of RPU, USAID Project Officer, possibly food program consultant, NGO representative	ad hoc food team TDY or consultant under AID contract	RPU: familiarity with local conditions participation in food team	verify <u>cartes de famille</u> to get accurate records on family size
	b Identification of quantity needed during each phase of project based on household data & policies above & notification of WFP representative	Chef of RMU, NGO, WFP	ad hoc food team	RPU; same as above	

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
continued	c Transport to project sites & distribution	SH & USAID/Bamako verify timing & availability of stocks with WFP; WFP to ship by rail to Mahina & possible transport to Manantali; NGO to transport & deliver to village sites	Agreement between WFP and GRM USAID-NGO contract	SH: verification with WFP RPU: coordinates programming of quantity, location & timing of delivery with NGO & WFP	
	d Storage of food supplies	Direct distribution to population as soon as possible; recipients provide storage and security	Oral communication to villages by NGO	RPU: Same as above	Monthly shipment preferred; local managing to be constructed
	e Assessment of agricultural input needs/demand	RPU Monitoring Unit in consultation with ODIPAC agents and farmers	Interagency agreement with ODIPAC	RPU: review and authorization of campaign plan	Will external TA be needed? Will REDSO or contract USAID agronomist be needed to work with ODIPAC chef de cercle and field staff to set up campaign plans?
	f Establishment of policy on agricultural input distribution e.g. will seeds be provided free?	Chef de RPU & USAID Project Officer in consultation with village chiefs & ODIPAC senior staff with input from field agents	SH - ODIPAC interagency agreement	RPU: Same as above	
	g Procurement of inputs	USAID Contractor subject RPU & USAID approval	SH - ODIPAC interagency agreement	RPU: liaison with ODIPAC	
	h Storage, transport & delivery of inputs	Possible ODIPAC facilities and ODIPAC agents; Contractor or NGO transport	SH - ODIPAC interagency agreement	RPU: liaison with ODIPAC	Consider use of project contractor or NGO transport resources

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<u>Goods and Services</u>	<u>Function</u>	<u>Expertise/Responsible Agency</u>	<u>Mechanism</u>	<u>SH/RPU Capabilities Required</u>	<u>Remarks</u>
7 continued L I V E S T O C K S U P P L Y	i Establish- ment of veterinary post & vaccination park	RPU coordination with elevage agents, USAID/ADO and Ministry of Rural Development	SH - Elevage interagency agreement	RPU: develop & negotiate pro- posal for interagency agree- ment with Elevage SH: authorize interagency agreement	Consider this under Mali Livestock Sector Project In the vil- lages we vis- ited, animal traction was much in use yet farmers report- ed receiving no livestock services in 3 years
8. H E A L T H and E D U C A T I O N	a Water related disease surveil- lance b Routine health services	Epidemiologists at Mahina under WHO project and USAID IDP Health Component To be negotiated with Ministry of Health & World Bank by PP design team	 None RPU: liaison with Ministry of Health & World Bank SH: support RPU in authori- zing proposals for service delivery and construction	 See section in Health IDP Analysis p. Existing ser- vices almost nonfunctional training, drug delivery sys- tem & super- vision required in addition to new facility and equipment	

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The Role of Service Hydraulique

As the preceding charts indicate, the role of the RPU would be to make and monitor key policy determinations to provide coordination of all project components, to maintain a flow of information to and from the villages, to handle external relations with the Projet de Barrage, and other governmental agencies, and to monitor performance under interagency agreements and contracts. These are functions which require on-site staff.

The Division of Energy and Dams would provide the National level support required to enter into interagency agreements and to assure that those commitments are honored. This role is different from the detailed operational management of most functions which would be performed under a variety of interagency agreements and contracts. The functions of Service Hydraulique and the RPU are summarized in Chart 3, page 28.

Service Hydraulique currently does not have the capacity to provide directly most of the goods and services required, and it can be argued that developing the capacity to deliver food, build houses, provide agricultural and livestock extension, etc. in an organization like Service Hydraulique would not be an appropriate use of scarce management and technical skills. On the other hand, the capacity to plan, coordinate, and monitor the provision of these goods and services in an area where a dam causes dislocation of the population is a capacity which Service Hydraulique staff may need in the future and is thus worth developing.

Use of Non-governmental Organizations (NGOs)

The procurement and distribution of building materials from local sources, recruitment and payment of labor among the villages, supervision of construction crews, and distribution of food supplies are critical activities which will require the support of agents familiar with the area but also which are highly vulnerable to leakage and mismanagement. A substantial role in the construction of housing and public areas and food support would thus be given to a non-governmental organization; and preferably an international private voluntary agency with extensive experience in resettlement and disaster relief efforts. Because the private voluntary agencies which are currently operating in Mali have limited programs here, contact should also be made with others which have more experience with this type of program, e.g. Oxfam.

While some transportation would be provided to the Resettlement Project Unit to support staff needs, trucks to transport building materials, food, workers and eventually some of the settlers and their belongings would be provided through this organization. Fuel will be available through the Projet de Barrage as well as mechanics services on a fee for service basis. Contracts for additional transportation if needed during the move

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could also be made by this unit. Maintenance of records on food received and disbursed, materials procured and placed, and other financial accounts will be maintained by the NGO in accordance with USAID & WFP standards. Contact should be made with experienced PVOs as soon as possible as their consultation on policy decisions about replacement of structures and construction options may be valuable to the project manager and USAID project Officer.

CARE has experience in the construction of dug wells in Mali which should be kept in mind as the hydrology studies become available and the appropriate methods for constructing wells are determined. With local participation, CARE planned to install up to 15 wells per year in the Douentza area, but notes that the necessity of installing the bottom of the well during the height of the dry season may result in delays in reaching the projected number. CARE will be completing some of its current wells activities within 18 months but are somewhat cautious about expanding into a more geographically remote area. If no dug wells are required, CARE may be a less appropriate source for this activity.

Assuming USAID/Mali will require an institutional contractor to assist in implementing the project, a non-governmental organization could be subcontracted to provide the goods and services described above.

USAID/Mali Management

The above analysis of functions clearly indicates a heavy burden on USAID/Mali and particularly USAID Management, Engineering and the Project Officer in the implementation of this project.

The approved level of staff and personal service contractors is not sufficient to meet this work load. Thus, the Mission will establish a small project support unit under an institutional contract which will include the appropriate engineering staff and procurement and financial management specialist who are thoroughly familiar with USAID requirements; this unit might serve all four Region One projects. It should be noted that the transportation requirements from Bamako are likely to be greater than the existing vehicle fleet or available rail transportation can provide on a reliable and timely basis. The Mission should consider the feasibility of providing air transport on a rent or lease to the First Region projects through this project support unit. In Chart 2 and 5, it is assumed that an institutional contractor will be required.

Whether a separate unit is created or not, careful coordination will be required among the Management, Engineering and Project Officer Staff. The technical staff in Health, Forestry, Agriculture, and Livestock will be needed for consultation on some components. The Evaluation Officer should

review the studies and evaluations planned. Thus, the time requirements of the Manantali Resettlement Project should be clarified for each staff member and included in their expected scopes of work for each year. The project officer would be responsible for appropriately utilizing the technical staff who are part of this project implementation group.

There is no à priori reason why the project officer should be placed in the Agriculture and Livestock Division of the Mission; agricultural and livestock development activities are only two components among many. The majority of the functions require engineering, health, and forestry support and the project officer could easily be located in GDO where the majority of these technical staff are assigned. In Chart 2 which follows, the functions of USAID/Mali, an institutional contractor, and a possible nongovernmental organization sub-contractor are summarized.

Next, one can derive organizational structures for the Resettlement Project Unit. In the organigram presented in Chart 3, those functions which might be carried by each division are indicated: staffing levels are tentatively suggested, and these should be examined more carefully during the PP design. It should be remembered that staff requirements will increase the need for staff housing at Manantali. Use of ODIPAC agents who already have housing in the area will reduce this cost also. The organigram proposed by Service Hydraulique will then be presented in Chart 4 briefly discussed. Finally, the structure of organizational relationships among the proposed implementing agencies is shown in Chart 5.

There is no one best way to organize. The two structures presented above make different assumptions about the roles of the RPU, Service Hydraulique and USAID. This Service Hydraulique structure is based on the assumption that the full complement of staff would be detailed to the RPU which would result in a total staff of 16 technical positions plus secretaries, chauffeurs, guardians and maintenance staff. The first structure proposed assumes use of contracting and of interagency agreements which would reduce the burden for direct management of staff but would increase liaison and coordinating functions of the RPU staff. Total staff directly managed by the RPU in this case might be 8 plus secretaries and other support staff.

A second difference is that the Service Hydraulique proposal would maintain its accounting and administrative staff in Bamako. In the structure proposed earlier, disbursement and accounting for the limited funds actually expended through the RPU would be done on site in order to be responsible to the immediate needs of the project. Banking facilities will be available at the Manantali site. Considerable delays may result if change to authority for disbursement required authorization in Bamako. If Service Hydraulique has strong objections to this authority at the project unit level, some means of providing a petty cash fund which is replenished monthly based on accurate

CHART 2

FUNCTIONS OF USAID/MALI; INSTITUTIONAL CONTRACTOR AND NGO SUBCONTRACTOR

Institutional Contractor

Nongovernmental Subcontractor

USAID

Procurement of commodities for housing offices

Project officer and Management Office approve procurement plan

Contracts for housing and prepares renovation plans

Management office approves contracts for housing; engineering approves renovation plan; Project Officer Engineering inspect work and authorize payment

Provides multidisciplinary team to review and verify site selection in collaboration with SH & RPU

Approves short term contractors to review site selection

On collaboration with RPU, drafting of subcontract or agreement with Eaux et Forets for plan of trees to be retained and for nursery

Negotiates Cooperative Agreement with Institute for Development Anthropology and AID/Washington for monitoring and evaluation

Arranges subcontract with land clearing firm to clear fields and with firm for transportation study

Project Officer, Management, Forestry Officer to review subcontract with Eaux et Forets

Provides engineer and short-term topographer to specify terrain constraints and construction sites and equipment requirements

Project Officer and Management approve subcontract

Prepares subcontract for road construction and provides on site monitoring in collaboration with RPU

Approves subcontract and/or consultants

Project Office and Engineering sets criteria and specifications for bidding; Engineering, Management, Project Officer review technical proposals and cost proposal in collaboration with RPU; Project Officer & Engineering review work and authorize payment

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CHART 2 continued

Institutional Contractor

In collaboration with SH & RPU, develop subcontract for test drilling and monitors work

Collaboration with RPU & SH, prepares subcontracts for well construction, routine inspection of work, final inspection and payment

In collaboration with RPU prepares subcontract with nongovernmental organization to handle village construction, masonry training, and food distribution

Provides short-term agronomist to collaborate with RPU in assessing agricultural input needs; assists RPU in drafting interagency agreement or subcontract

Nongovernmental Subcontractor

CARE as possible subcontractor for well construction

Collaborates with RPU in developing policy purchase of locally collected materials, constructs storage facilities; hires local workers, supervises work sites; trains masons

Advises on food program policy; distributes food supports in accordance with policy

USAID

Project Officer, Management approve subcontract; Project Officer, Engineering review work; Project Officer authorizes payment

Engineering, Project Officer, Management approve subcontract and Engineering and Project Officer inspect final work and authorize payment

Project Officer in collaboration with RPU reviews plans and procedures for inventory of individuals and structures to be conducted by Institute for Development Anthropology

Project Officer, Management, Engineering review subcontract; Project Officer, Management, Engineering approve subcontract

As member of team, Project Officer develops policy on food distribution and monitors implementation

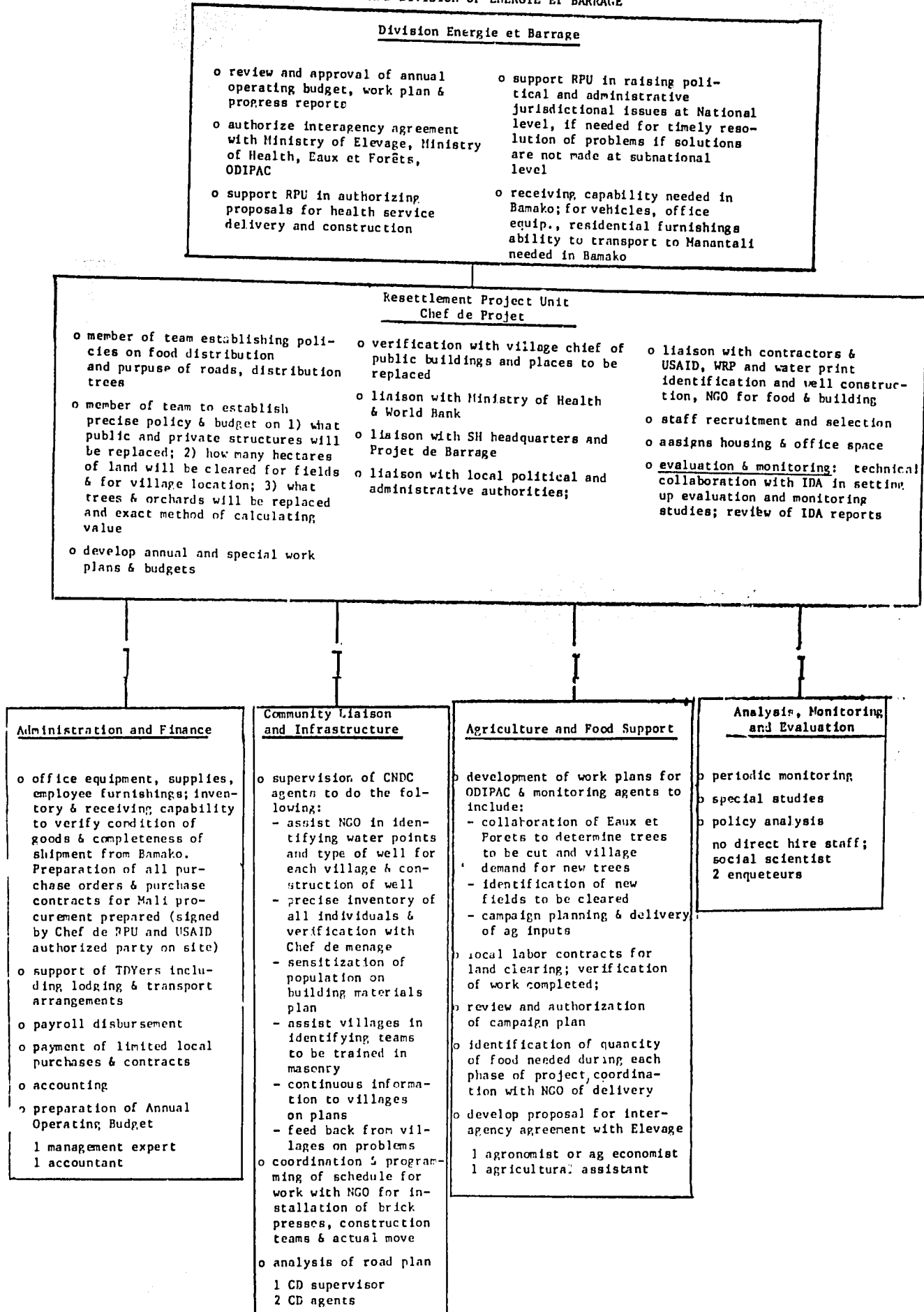
In collaboration with RPU & SH and contractor Project Officer participates in assessing needs for agricultural support services; assists SH & RPU in developing interagency agreement with ODIPAC and Elevage; Project Officer and Management approve interagency agreement or contract; Livestock Officer advises on plans for services under Mali Livestock Sector Project

Project Officer coordinates with RPU, IDP Project Officer and Regional OMVS staff in monitoring river-related disease surveillance activities, coordinates with World Bank, RPU in planning facilities and services in project zone

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Table 3

ORGANIGRAM AND FUNCTIONS OF RESETTLEMENT PROJECT
UNIT AND DIVISION OF ENERGIE ET BARRAGE



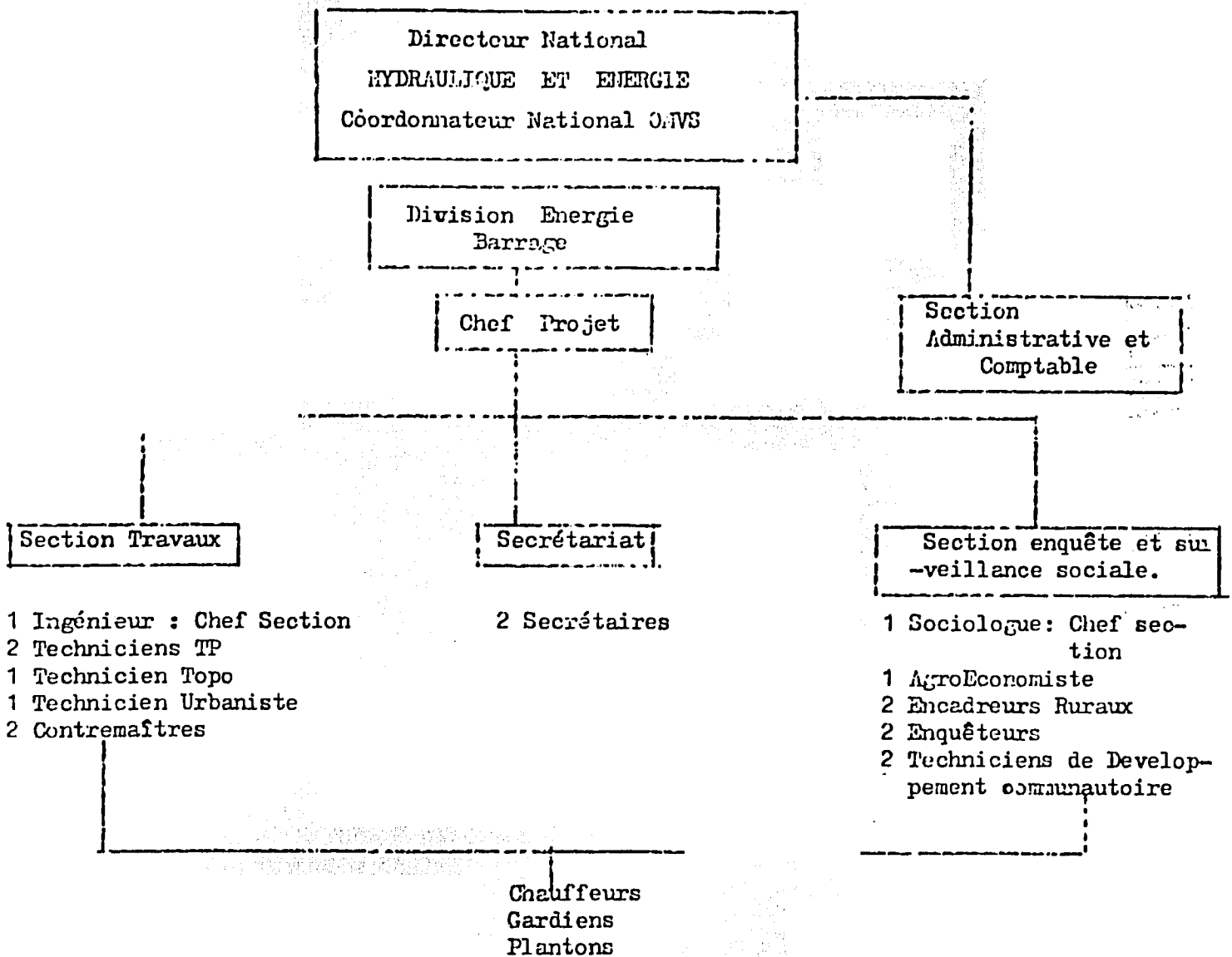
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The structure and staffing proposed by Service Hydraulique
is presented below.

Table 4

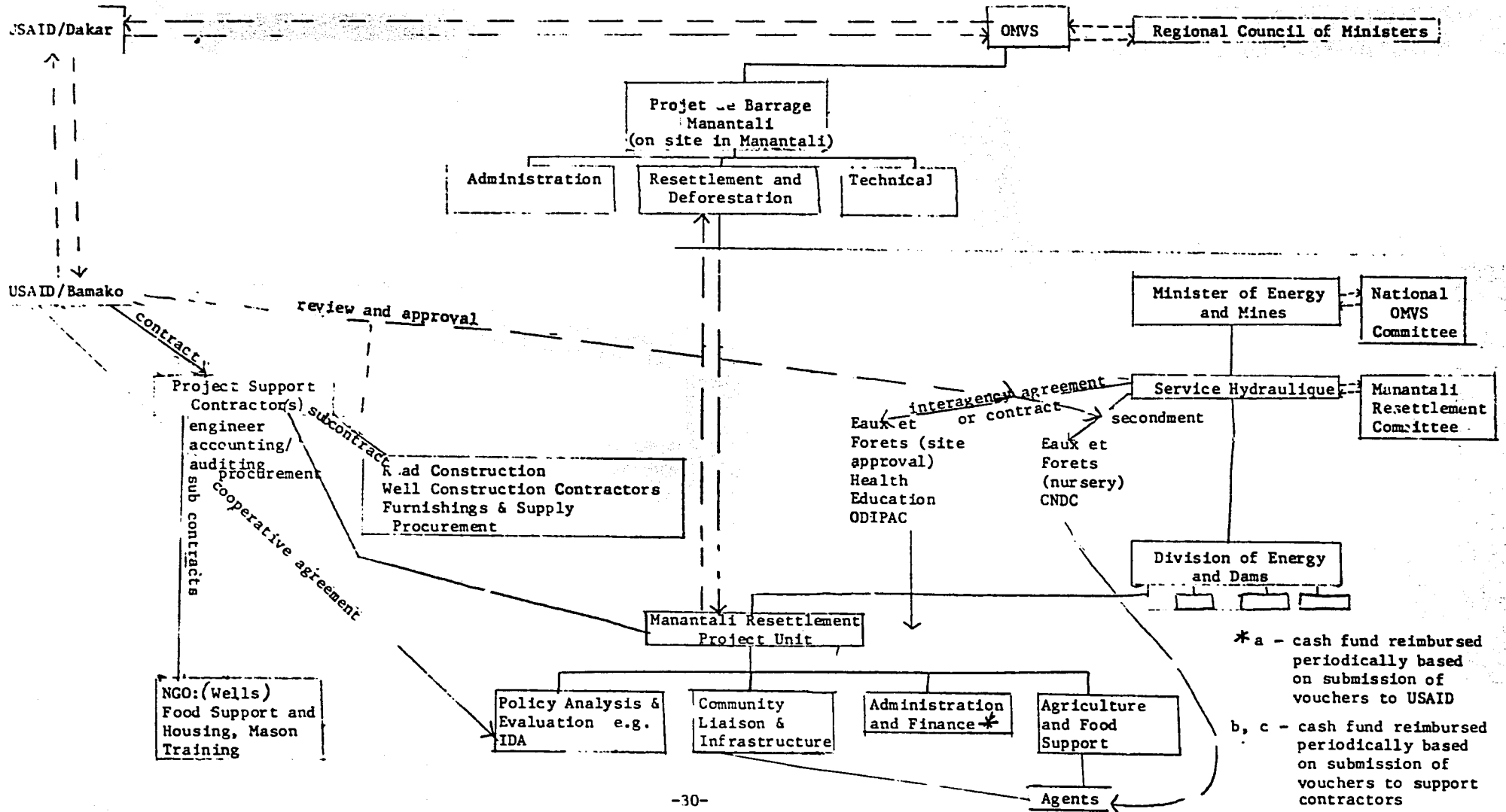
Organigramme de la Cellule de Projet Recasement des Populations de MANANTALI

Phase des Travaux



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CHART 5
STRUCTURE OF ORGANIZATIONAL RELATIONSHIPS FOR
MANANTALI RESETTLEMENT PROJECT



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accounting of expenditures must be established.

The final choice about an organigram for the RPU will depend on clarification of role of all the agencies.

Special Issues

USAID's Role in Health and Education Services Delivery Systems in the Resettlement Area

In discussions with Director Chief of Project of the Manantali Dam and OMVS Representative, they indicated concern that health and education facilities and services would be included in the Resettlement Project. They reiterated that the villages had agreed to amalgamate at least in part because of promises of services which were made during the PID team discussions regarding choice of new sites. In discussions with DEO before our trip, it was indicated that USAID involvement in establishing these facilities and services under the project would be restricted.

There are three aspects of the issue which should be clarified as soon as possible so that the villages considering amalgamation can assess the importance of the availability or non-availability of these services as they make a final decision on amalgamating during relocation:

1. Will the resettlement project fund replacement of the one dispensary (Bamafele) and two small schools (Bamafele et Kenieba-Bafing) at the new sites ?
2. Will the project support development of new health and educational services in the newly settled villages ?
3. If project funding cannot be made available for replacement and/or expansion of services, what commitments can the Ministry of Education make regarding support for these services ?

It should be noted that support of health services is more complex than construction of facilities. For example, the existing dispensary at Bamafélé is rarely supplied with drugs, and adequate equipment is not available. Due to transportation difficulties, the infirmier sees only seriously ill patients in the villages other than Bamafélé where he is based. The matrone's services are sought by fonctionnaire families only as other village women prefer traditional birth attendants who are older.

The Chef d'Arrondissement stated that the Direction General of Health had informed him in May that Bamafélé was a priority for a dispensary, and that a new one would be constructed immediately in order to strengthen the population for this move. Without strengthening of the drug supply system, the provision of transportation and equipment, construction of a new facility alone will not be sufficient.

Recommendations

1. Verify plans for MOH financed construction in current location of Bamafélé.
2. If MOH is not currently planning improvements in Bamafélé, formally request through the Ministry of Health that the World Bank financed health project in the First Region provide for construction of a dispensary and staff housing along with equipment, training, and drug supply and local financing systems at the new location of the arrondissement of Bamafélé or at the location of greatest population concentration in the resettlement zone. USAID has alerted Mike Furst of the World Bank of this concern.
3. If USAID will not provide support for expansion of health services and construction of facilities in amalgamated villages, OMVS, Service Hydraulique, and the villages to be resettled who have agreed to amalgamate, and the Ministry of Health should be formally notified. Other donor contributions should be sought by OMVS, Service Hydraulique and the Resettlement Project Unit Chef.
4. USAID/Mali may want to consider providing temporary, disaster relief-like services during the months of resettlement.

USAID/Mali is not involved in formal education and I am not aware of GRM and/or foreign assistance support which may be planned for the resettlement area.

Clarification of Villages Involved in Resettlement

Based upon an analysis of the revised map of the reservoir, some questions about which villages are being relocated entirely and which should be programmed for partial relocation remain. The following villages have been identified in the PID and appear on the OMVS map of Mission A1.15 as being clearly in the area to be innundated:

Soukoutali	Farabandi	Kambou
Sékókoto	Kouroukondi	Tima
Dialakoto	Firia	Diba
Souroufouga	Kéniéba	Koba
Kéniékéniéko	Tondidji	Sitaninkoto
Nigui	Ganfan	Sandegnan (Mahina)
Tintilla	Marena	Barlakourou
Kouroundi	Konkorma	Banbouta

Bamafélé
Sitajéto

Gougondala
Kouniakan

Goumbalan
Badioke

In addition, there are several small villages which are not mentioned in the PID but which appear to be included in the innundated area on the revised map. It is understood that the official list of villages even though an adjacent hamlet may have become the center of population (e.g. Sandegnan is officially a village though most of the population in that area is in Madina, which is not recognized administratively as a village). OMVS at Manantali does not have sufficient data to verify that these villages are in fact to be innundated.

Actions to be Considered

These should be added to the list of sites to be innundated, and initial visits made to them by a Service Hydraulique/USAID/DEO team: Dialamokoli, Tiemoko, Liliiko.

Finally, there are a few villages which are included in the PID as villages to be relocated but which do not appear to be in the innundated area on the map. It is possible that only the fields of these villages are affected, but the location of these villages in rocky areas may prohibit relocations of these fields, requiring transfer of the entire village or hamlet population:

Dickeli
Kolia
Kologo
Samantoutou

Ougoundinko
Solo
Nounkala

Action to be Considered

The terms of reference for a pedological, agrosocioeconomic and topographic studies could be amended to include assessment of the feasibility of relocating the fields only. Because these villages have previously been located inland away from the river, the changes in their existing farming systems as a result of new proximity to the river if they remain at their current sites should be analyzed. These findings should be presented to these villages as soon as they are available and probably by the PP design team.

Political and Administrative Jurisdictions

There are also jurisdictional issues which may emerge during the course of the project. These issues are of direct concern to government of Mali officials and not to USAID; they are mentioned here only remind the project design team and implementation staff that Service Hydraulique will have an important role in coordinating with national and subnational political and administrative leaders as final sites are chosen. The affected villages are within the domains of three cercles: Bafoulabé, Kita and Kenieba. Each commandant de cercle and chef d'arrondissement within the Cercle of Bafoulabé should be consulted and kept informed. Bamafélé will be required to

relocate. Whether or not it is re-established as an arrondissement will depend at least in part on their proximity to another existing arrondissement. This issue will be decided by the commandant de cercle, possibly in collaboration with regional and national of the Ministry of Interior.

In addition, eleven villages are reconsidering the possibility of relocating at sites within the Kita Cercle in order to alter their political jurisdictional arrangements. At least nine are among those expected to be resettled by the project:

<u>Village:</u>	<u>Currently Listed in PID</u> <u>in Village Group No.:</u>
Konkorma	no. 7
Tonididji	no. 7
Kambou	no. 7
Ganfan	no. 7
Marena	no. 7
Sandeguan	no. 5
Badioke	no. 6
Goumbalan	no. 3
Ougoundinko	(see above)

A national delegation was expected to visit the project area in early January* to clarify their preferences.

Finally, discussions with other governmental agencies (i.e. ODIPAC) about their support in the project area should take into consideration the fact that the project touches several arrondissements in several different cercles.

*1983

PERSONS AND PLACES VISITED

Robert Dembélé, Service Hydraulique

M. Maiga, Director, Office d'Exploitation et de Recherche de Ressource du Haut Niger (OERRHN)

Mme. Doumbia, Volet Social, OERRHN

M.B. Doumbia, Chef de Village, Kangaré

M.O. Diaque, Adjoint Administratif, OERRHN

M. Fabou Doumbia, Chef de Village, Kangaré

M. Djoyo Doumbia, Chef de Village, Kendiguila

M. Salikou Daniolo, TDC, Volet Social, OERRHN, Sélingué

Toufig Ben Amara, UNDP

Michael Furst, Health Project Team Leader, World Bank

Peter Fisher, German Embassy, GTZ

Jean Peters, World Food Program

M. Dolo, Adjoint du Commandant de Cercle, Bafoulabé

M. Ciéfing Cissé, Eavet Forêts, Bafoulabé

Dr. Bassidiki Traoré, Directeur de la Santé, Bafoulabé, Ministry of Health

M. Karim Sako, Chef de Secteur, ODIPAC, Bafoulabé

M. Dembélé, Chef de Village and other village members, Kéniéba-Bafing

M. Bode Dembélé, Chef de Village and other village members, Tondidji

M. Garba Kontao, Chef d'Arrondissement, Bamafélé

M. Dembélé, Chef de Village and other villages, Nigui

- Village members, Binkassi
- Village members, Djinfiti

Commandant de Cercle, Kita

Garan Konaré, Chef, Projet de Barrage, Manantali

Ela Sissoko, Projet de Barrage, Manantali

David Hess, REDSO

Dan Jenkins, REDSO

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FOOTNOTES

(1) Scudder, Thayer. The Development Potential of New Lands Settlement in the Tropics and Subtropics: A Global State-of-the-Art Evaluation with Specific Emphasis on Policy Implications. Institute for Development Anthropology and California Institute of Technology, October, 1981.

(2) Ibid, p.

(3) In this analysis, indirect services will be listed with the direct good/service which it supports. Conceptually, however, direct goods and services are those which are delivered to the resettlers, e.g. food supplies, agricultural inputs. Indirect services and activities are those functions which involve face to face contact with clients for actual transfer of goods and services but which are required to set the context in which that transfer occurs (e.g. setting policies on sales vs. gifts of new trees) or to support direct delivery (e.g. analysis of ag input requirements).

LIST OF ABBREVIATIONS AND ACRONYMS

DNC	Direction Nationale de la Coopération
ODIPAC	Opération de Développement Intégré pour la Production d'Arachides et de Céréales
RPU	Resettlement Project Unit
OMVS	Organisation pour la Mise en Valeur du fleuve Sénégal
USAID	U.S. Agency for International Development
NGO	Nongovernmental Organization
PP	Project Paper
Service Hydraulique	Direction Nationale de l'Hydraulique et de l'Energie

7.6 - ANNEX: AGRICULTURAL ANALYSIS

7.6.1. Soils

The project area is part of the Mandingue Plateau which lies within the Soudano-Guinean climatic zone. Seasonal rainfalls from May to October of 800-1200 mm and the presence of heterogenous soils permit cultivation of many crops. The landscape is dominated by sandstone mountains, gently rolling plains with dryland crop capability, and humid microclimates along tributaries and in lowlands where vegetable gardening and flooded rice are possible. Soils are predominantly Alfisols. From a reconnaissance soil study conducted by the Institut d'Economie Rurale (IER), adequate arable land is available in the resettlement area, primarily downstream of the Manantali dam.

There are two predominant morphopedological units in the resettlement zone: one is a rolling sequence with a subsurface layer of plinthite (lateritic material) and the other is an homogeneous plain of deep fine loamy sands and fine loamy clays. Both units are exploitable under the traditional extensive cropping systems currently practiced. The soils containing plinthite are arable depending upon the depth of the upper horizons; where the soil is shallow, these areas have marginal agronomic utility and should be left as natural pastures and forests. If the topsoil is sufficiently deep (greater than 30 cm) low intensity cultivation of peanuts, fonio, cowpea and bambara nut is possible. However, once the topsoil has been removed, productivity declines sharply as the impermeable plinthite layer restricts root growth and water movement.

The deep, porous soils typical of the plains in the project area are polyvalent, useful for most dryland crops and fruit trees. They have a high water-holding capacity and are friable, and, therefore, workable with traditional land implements.

Some hydromorphic and alluvial soils are also available in the resettlement zone. The hydromorphic soils are found principally in the Sitaninkoto zone (# 5). They are high in clay content and drain poorly. They may flood during the rainy season and are therefore limited in use to rice culture. If drained their cropping potential would increase. The low-land and alluvial valleys are composed of deep rich loams and loamy clays and are useful for both rainfed and irrigated rice, maize and garden crops.

In summary, the soils in resettlement area are similar to the soils currently used by project farmers. Soils of the four major categories described above are in sufficient supply in the new zones to meet farmers' agronomic needs. While the soil survey conducted by IER was not the sole or the primary factor used when selecting village sites, it was an important part of the exercise.

7.6.2. Crops

Agriculture is the major occupation for 90% of the active population in the project area. Major crops are sorghum, millet, maize, peanuts, and both upland and lowland rice. Peanuts are the primary source of cash income. Other crops traditionally cultivated in the area are fonio, bambara nut and cowpea. Major constraints to traditional agriculture are irregular rainfall and remoteness from markets, though soil fertility, seedbed preparation, seed quality and labor are also factors.

According to a 1978 survey conducted by ODIPAC, the local extension agency, the average yields of major crops were:

<u>Crops</u>	<u>Yield: Kg./Ha.</u>
Peanuts	910
Sorghum	610
Millet	830
Fonio	540
Maize	620
Rice	400

This low productivity can be attributed to the extensive and traditional methods used. The project area is isolated, sparsely populated, and lacks good roads and access to markets and population centers. Pressure on arable land is low. A system of fallowing is used to maintain soil productivity and the use of commercial inputs is minimal. The cropping and fallowing patterns differ according to the crops planted and the type of soil; most typically, three or four cropping seasons of cereal/peanut rotations are followed by fonio until fertility is so diminished that a subsequent fallow of five or more years follows. Some farmers report continuous cropping of peanuts in rotation with cereals up to ten years before fallowing.

The natural vegetation ranges from forested to herbaceous savannas. There are valuable trees in the area, both for wood and edible uses, including the shea nut (*Butyrospermum parkii*), locust bean (*Parkia biglobosa*), kapok (*Bombax costatum*), African mahogany (*Kaya senegalensis*), ronier (*Borassus* sp.), baobab (*Adansonia digitata*) and mango, citrus, papaya and banana. Land-clearing is traditionally done by hand, using machetes and axes and valuable trees are left standing. Field vegetation is burned after a drying period and stumps and fallen trees are frequently left in the field. Most planting is done by hand and animal traction is not widely used.

In recent years ODIPAC has been promoting the use of improved peanut, maize and rice seed, animal traction, agricultural equipment (plows, seeders), inorganic fertilizers, manures, and fungicides. The following data from a 1978 survey of 827 production units indicate the extent to which various improved practices have been adopted by farmers:

<u>Practice</u>	<u>% Using</u>
Improved seeds	60.0
Inorganic fertilizers	52.0
Manure	32.0
Fungicides	27.0

From this survey there were 45 plows and 20 seeders in use in the area.

In previous years ODIPAC* and its predecessor organization, OACV,** were charged with the commercialization of peanuts and provided credit to farmers to encourage use of improved practices. Since the fall in world market peanut prices a few years ago, ODIPAC has changed its emphasis from peanut production to crops development. Credit is no longer available and expanded use of animal traction and commercial inputs is likely to slow. With World Bank financing, ODIPAC now is trying to define and understand local agricultural problems and suggest appropriate technical solutions. Crop diversification is encouraged; both soybeans and sesame have been introduced and intensified maize production is encouraged. ODIPAC conducts multilocational trials on improved seeds, which is the most fully transferred innovation in the area. ODIPAC finances studies and supports village associations in marketing. A study is in progress to propose ODIPAC assistance to the resettling farmers, with perceived needs being in land clearing, potable wells, and market access.

In determining how to be responsive to problems which will arise from resettling, AID considered the question of seed supply. In the project area farmers are generally self-sufficient in meeting their seed requirements. As seed multiplication and distribution requires a great deal of management to be done properly, it is not within the scope of this project to undertake such a task. Farmers will be informed that they are expected to carry their seed with them to their new villages. AID will, of course, finance the transportation. In cases of shortages, ODIPAC, which has a system of seed production and distribution operating in the area, should be able to respond.

7.6.3. Livestock

Livestock, including cattle and small ruminants, play an important role in the farming system of the resettlement area. The Meren breed of cattle is raised for its resistance to trypanosomiasis and is used as a dual purpose meat and milk animal. Goats and sheep are also prevalent. An extensive system is used wherein animals forage freely over the dry season and are grazed under more contained conditions and bedded in pens during the cropping season. The locations of these pens are moved from year to year, thus fertilizing different areas.

* Operation for the Integrated Development of Peanuts and Cereals

** Operation Peanut and Cereals Crops

As the resettlement zone is ecologically similar to the zone currently inhabited, no problems are envisaged in transferring livestock production from one zone to the other. Pasture is not subject to intensive grazing pressure under the traditional system used. Access to water is expected to be similar in both places with animals frequenting springs, streams, and natural catchments.

Villagers will be responsible for herding their animals to the new village sites.

7.6.4. Trees

In the Manantali area villages, a variety of tree species form an important component of the present farming system. These are primarily fruit trees - mango, citrus, papaya and banana. The number of trees per farmer and thus their relative income generation value varies considerably throughout the zone. The villagers of Kenieba reported possession of only two mango trees whereas it was evident that villages such as Tondidji and Kouroukondi have hundreds. It is estimated that many male farmers have six to ten mangoes with some owning considerably more. Once the trees have become established they require little or no yearly input and the benefit cost relationship becomes extremely favorable, especially in comparison with annual cash or non-cash crops. Fruit trees are money in the bank.

Farmers in the resettlement zone state that mangoes can be worth as much as 50,000 FM a year which is a considerable sum for the area. Villagers value mangoes highly, particularly since they ripen prior to or at the beginning of the rainy season when other foodstuffs are usually in short supply.

In addition, mangoes are valued because they can be used as gifts or alms and thus fortify the social prestige of the farmer. Mango trees also function as important inheritance items that a farmer may leave behind to his children or grandchildren.

Other forestry species are important to the area in addition to fruit trees. These include baobab, ronier, karite and others. They are sometimes planted and often protected. They can provide revenue through the sale of leaves, rope, fruits and sheanut butter. It is difficult to quantify these benefits since they are basically products gathered from the bush and transformed and consumed at a family or village level. It is evident, however, that resettlement will cause a loss of income and nourishment when people are forced to abandon their orchards.

In the resettlement zone, valuable trees will be protected during land-clearing. Villagers will be responsible for sawing and stockpiling fallen trees for reconstruction and fuelwood. This will not, however, compensate villagers for the established orchards which will have been lost to them and this is a prevalent worry expressed by villagers. Therefore, the project will give priority to compensating villagers for the loss of their orchards. During preliminary technical studies of the resettlement zone financed by UNDP, a census of orchards and fruit trees was completed by the Institut de l'Economie Rural. When determining compensation amounts, established older trees will be considered as more

valuable than seedlings. Compensation will be paid to villagers as a function of the production of the number of trees over the period it takes to establish new ones.

The above does not, however, get the new trees planted or increase access to improved species or techniques. To address this, the RPU/PMU will contract with the GRM's Eaux et Forêts (planned by January 1985, see Section 2.8.3.4.) to establish a nursery at the largest new village, "New" Bamafele. The nursery will be approximately one hectare in area and should be able to produce about 30,000 trees a year. Species will include mangoes, citrus, guava, papaya, etc. The nursery is described in Section 2.8.3.4. Trees will be sold at a price to sustain recurrent costs since cash compensation will have been given.

7.6.5 Summary of Agricultural Resettlement Issues

a) Productivity of new land brought under cultivation:

As described on the Soils analysis (7.6.1), sufficient arable land is available in the Resettlement zone to duplicate the traditional cropping system of farmers in the project. However, during the first few years, productivity of this land newly brought under cultivation will be lower than average. This will likely be due to improper or partial clearing of land, increased weed density, and the farmers' own lack of knowledge about the newly cleared area which will affect crop management practices. To address this problem of expected crop shortfalls, the project will distribute WFP food aid to villagers for two years as described in Section 2.8.3.3 .

b) Land clearing:

During the initial 5-year period, land clearing will be a major task resettled farmers will have to face. Approximately 6,000 hectares of land are estimated to be cleared by the project. The population to be moved is approximately 10,000 people. According to the recent IER survey, within this population are approximately 800 UPA (Unité de Production Agricole) and each UPA cultivates an average of 7.5 hectares per year with approximately half as much in fallow. Most of the land will be used for upland crops; approximately 5% will be fertile land in house fields for maize; 2% will be lowland for rice; and 5% will be for irrigated garden crops. Fallow areas will not be cleared by the project.

Given the vast area to be cleared and the labor and time constraints facing villagers, it is unrealistic to expect that farmers will be able to clear their own land. Farmers have stated that felling and cutting trees is the most arduous task in land-clearing. Some farmers have also stated that Andropogon gayanus and other plants are quite difficult to remove. Therefore, the project will assist villagers in land-clearing.

In choosing the most appropriate method of land-clearing (see 7.2.3). The factors of time, cost, village participation, availability of labor and ecological degradation were considered. Where dense conditions require mechanized clearing, a bulldozer mounted with a shear blade or with chains or bladed rollers will be employed. No large trees will be uprooted and no land leveling or seedbed preparation will

be done. Where necessary, due to the density of trees and heavy brush, larger, fallen trunks will be pushed or dragged to the field perimeter. Machine traffic over the field will be limited and will be done only under dry field conditions to minimize soil compaction. Farmers will be responsible for burning off scrub and for seedbed preparation. The land-clearing plan and contract will be approved by AID prior to execution.

c) Loss of productivity from valuable tree species:

The project will assist villagers in two ways to compensate for valuable tree species which must be abandoned. A cash compensation will be made to each farmer based upon a census of his trees and their estimated value over the period it would take to establish new ones. In addition, RPU/PMU will contract with the GRM's Eaux et Forets to establish a tree nursery in the project zone. This nursery will produce approximately 30,000 trees/year which will be sold to farmers at a price which will sustain recurrent costs.

7.7. ANNEX: PUBLIC HEALTH ANALYSIS

7.7.1. INTRODUCTION

The Manantali resettlement project includes a health component intended to achieve several objectives.

First, planning the location of the sites where new villages will be built was done with the intent of protecting the population from known or potential breeding sites of the onchocerciasis vector. At the same time, an attempt was made to locate the villages at some distance from the banks of the river since the incidence of schistosomiasis will likely increase once the dam construction is completed. Hence, potential new village sites downstream from the dam have been situated away from the river but in accordance with site preferences voiced by the settlers.

Second, the project will replace and upgrade health facilities which will be flooded. Thus, a maternity clinic, a dispensary, and a pharmacy outlet will be constructed at the new site of Bamafele. In addition, a small health outpost will be built at Tintioulen, the main resettlement site of Zone 4 just to the east of the present location of Tondidji. These facilities will be staffed by Malian government personnel. The settler population should thus be afforded minimal care during and after the move.

Third, the project will finance an epidemiological/nutritional survey in order to establish or update basic information on the health status of the population. All cases of schistosomiasis or trypanosomiasis identified in the population will be treated, assuming the consent of the patient. Execution of the survey will assist the National Public Health Research Institute to develop a long term capacity to monitor the health status of people, not only in the Upper Senegal river basin area of western Mali but throughout the country.

7.7.2. THE EXISTING HEALTH SITUATION IN THE BAFING RIVER VALLEY

This section describes the health situation of the population to be resettled and compares it with what might be expected once the relocation has been concluded. Special emphasis is given to waterborne diseases but other parasitic and infectious diseases are discussed as well. Information on which the discussion is based has been drawn from three recent studies. The first is an extensive World Bank-financed epidemiological

study which covered three administrative circles (Evaluation Sanitaire des Cercles de Kita, Bafoulabe, and Kenieba---hereafter referred to as the KBK study) which included two villages affected by the resettlement project. The second was done under the auspices of the UNDP/WHO-supported onchocerciasis vector control project which considered the westward expansion of the project area to include the Bafing River Valley (Mise à jour des Données Concernant le Foyer d'Onchocercose dans la Phase I du Programme d'Extension Ouest, ICP/MPD/007). The third was the USAID-financed environmental study done in 1977-78 by the Gannett-Fleming consulting firm. This included several of the villages which must be resettled. Knowledge was also derived from a field reconnaissance in the project zone by the Sahel Development Planning Team health officer and personal contacts.

A. PARASITIC DISEASES

Malaria: Generally the same epidemiology, namely holo-endemicity or an infection rate at 65% and above, can be assumed for the present and relocation sites. Bingassi for example had a plasmodium index (PI) of 80.5% in 81, which compares well with 86% PI of an upstream village (Firia). Overall PI in the KBK area was about 43% with the following strain distribution: *Pl. falciparum*: 80.6%; *Pl. malariae*: 18.5%; *Pl. Ovale*: 0.9%. Overall spleenrate was 25%. As usual these indices are highly age specific: practically nil until 6 months of age (due to maternal antibody protection), with a sudden rise after 1 year (PI:62%) and a peak in the 5-9 years group (PI:69%), they fall equally sharply after age 20 and remain low (PI:21%), except for a flare-up in pregnant women (PI:36%). There will be some geographic variation between downstream settlers (who will most likely have the same malarial epidemiology) and lake shore settlers (who will encounter an increased anopheles population during the dry season due to perennial larvae breeding sites). However, vicinity to a dispensary or health post and therefore access to antimalarials might be more important than vicinity to larvae breeding sites. This has been shown in the KBK survey, where villages with a functioning dispensary had a significantly lower PI than the ones without health facilities in spite of similar pluviometric indices. Anemia is the disease most frequently associated with malaria, especially in the 5 to 15 years group which has also the highest spleenrates. Loss of working days due to malaria is difficult to measure but the fact that 31% of all surveyed adults complained about frequent febrile episodes especially during and after the rainy season (which is also an important agricultural activity period), suggests that at least some workdays are lost. Present seasonal variation is unknown but the enormous water reservoir of approximately 49 000 ha surface will undoubtedly influence seasonality with its perennial breeding sites for

anopheles larvae. Thus an increase in malarial incidence rates during the dry season ("la soudure", March through May) amongst the lake shore settlers might be expected. Disease specific mortality rates were estimated at 35% between 6 months and 1 year of age, 29% between 1-4 y and 20% between 5-9 years, thus making malaria the most important "killer" disease in the 6 month to one year group, and the more evenly all year round spread infection rate amongst the lake shore settlers will probably not alter significantly these mortality rates because of possible increased levels of natural immunity. Again, access to properly used anti-malarials will be more influential than geographic and seasonal changes. Prospective treatment as described under WHO strategy variant Nr. 1 will be the preferred intervention against malaria, although at some later stage chemoprophylaxis might be added on a selective basis. Widespread availability of cheap mosquito nets should be encouraged. All in all, it can be said that, from the malaria viewpoint, resettlers away from the lake shore might be better off, but, availability to chloroquine will be the most important influencing factor.

Onchocerciasis: Data obtained from the extensive research carried out under the OCP westward extension planning phase over the past years indicate that downstream settlers will probably encounter the same health hazards as now but settlers along the lake shore will experience a decrease over the next decade. Some villages such as Bamafele and Tintilia, which in 1981 had a 34% prevalence of positive skinsnips and a 0.20% blindness rate might experience an increase in oncho when settling in the Bingassi village which had a 51% skinsnips and a 1.24% blindness rate. The Manantali dam itself will not become a breeding site, since there will be no open water cascades. On the other hand, villagers from Goungoudala for example, with a positive skinsnip rate of 78.6% and a blindness rate of 6.36% will be certainly better off when resettled at the lake shores. Blindness rates vary extremely from as low as 0.17% at Bamafele to as high as 13% at Konkorma (blindness rates of 3% and above indicate hyperendemicity). Blindness rates increase sharply after 45 years of age (they are very rare amongst the 15-35 years labor force), and are about 4 times higher in males than in females. Of the surveyed villages near the Bafing river, 2 were found to be hyperendemic (Bambouta and Goungoudala, with a positive skinsnips rate of 75% and above) and 12 meso-endemic (seven of it with an elevated meso-endemicity between 50% and 75% positive skinsnips rate). It should also be noted that, in the overall KBK ophthalmological epidemiology, onchocerciasis forms only 18% of all visual impairments and ranks second (after cataracts) in the causes for blindness. In some villages however, onchocerciasis is cause nr.

one for blindness. The ophthalmological disease prevalence distribution in Bingassi is: 11.1% of the total population impaired vision/blindness due to cataracts, 3.2% due to onchocerciasis, 3.2% due to trachoma; the corresponding figures for Firia are: 8.6% (cataracts) 1.5% (onchocerciasis) and 10.8% (trachoma). The simulium damnosum savannah species was found to be the main vector. Simulium sirbanum was found recently in some villages. Larvicide resistance has not yet been detected. Thus, from the onchocerciasis viewpoint, it can be said, that lake shore dwellers and settlers in the Djinfiti and Kenieta area will, in most circumstances, be better off than before, but the ones settling in the Bingassi area will encounter the same hazards, or, if coming from hypoendemic villages (Bamafele, Tintilla, Firia) might be worse off. Since chemotherapy (Diethylcarbamacide) is partially effective against microfilaria only, adult worm treatment (suramine) due to its severe side effects unsuitable for mass treatment and nodulectomy only rarely practised in Francophone Africa, and since the westward expansion of the OCP seems at present unlikely, a resettlement policy which encourages village and wells construction away from the downstream rapids, seems to offer the only solution to this problem.

The somewhat uncontrolled settlement at Bingassi which has already started, might require selective breeding site spraying, possibly through ground level larviciding such as practised rather successfully in some villages near Bandiagara in the Dogon. Availability of abate (Temephos) larvicide and organizing periodical spraying should be encouraged.

Schistosomiasis: Whereas any significant change of malaria and onchocerciasis is debatable, schistosomiasis (S) will almost certainly rise significantly amongst the lake shore settlements, but especially in any large scale future irrigation schemes. Present S. epidemiology is largely unknown except for Bingassi and Firia which were of low endemicity in the 1981 KBK survey: parasite rates in urine samples were 4% for Bingassi and 9% for Firia. All species were S. hematobium. As usual, infection rates are highest amongst the 5-14 years population, somewhat lower amongst the 15-44 years old ones and very low before age 5 and after age 45. However, the debilitating effects (splenomegaly, anemia, liver/vena cava shunts) appear already several years after the infection, when egg output in the urine and stools might level off or actually decrease. The anticipated sharp increase of S. will not come from the indigenous population (who, at present, have a very low infection rate mainly because of the rapid flow of the Bafing) but probably from infected outsiders who migrate into the area. This has been precisely the case in the Selingue dam/lake 130 km south of Bamako, where several hundred heavily infected people from the Bozo tribe moved in and caused the beginning of an epidemic which now becomes more

and more endemic. Also, due to a very high biorythm (growth rate) of the snails (*Bulinus* for *S. hematobium*, *biomphalaria* for *S. mansoni*) in the newly created still waters, even a low indigenous infection rate usually builds up rapidly often within a few years. Again, the lake itself might be of a minor problem, but new irrigation with its close cycle of human egg passers, snails and swimming cercariae will certainly be. Since the major rise in *S.* will almost certainly be after the end of this project, and since practically no data on the present situation exist, an initial baseline survey including a malacological (snail) study before or shortly after resettlement and a periodic monitoring by the IDP health surveillance project is essential. Praziquantel (brandname biltricide), recently approved by the FDA (Federal Drug Administration) has changed *S.* campaign strategies in favor of treatment over snail control. It is effective against all species (*S. hematobium*, *mansoni*, *intercalatum*, *mattheei* etc.), highly effective (90% sensitivity and specificity), with hitherto unknown side effects and administered as a single dose by mouth. Although relatively expensive (Dols. 3 U.S. per single adult treatment), its price will probably go down when manufacturers multiply and mass production starts. However, reinfection will occur and the disease will follow the course of water, especially low current irrigation channels, until other, largely unaffordable measures such as wearing high rubber boots, banning people (especially children) from swimming, defecating and urinating, rigorous snail control, clearing of shore and irrigation channel vegetation, periodical flooding of the channels, and repeated diagnosis and treatment of the entire population will be introduced. The main difficulty in the trade off of decision (vicinity of water and therefore more fish in the diet, better body hygiene and easier irrigation/higher agricultural output versus increased schistosomiasis) lies also in the fact that the degree of debilitation through *S.* is still under debate. In the KKK survey, for example, no splenomegaly (by far the most common debilitating factor causing anemia) could be associated with the admittedly low prevalence of *S.* World wide studies on the impact on productivity are controversial too. All in all it can be said that from the schistosomiasis viewpoint downstream settlers without irrigated agriculture will be better off then the ones in the vicinity (means direct skin contact with infected water) of low current irrigation channels and, to a lesser extent, along the lake shore.

Ankylostomiasis: *Necator americanus*, the only species found, seems to be widespread (58% prevalence in downstream Bingassi, 65% in upstream Firia). However, parasite load (number of eggs/g of stools) is low, thus contributing probably little to anemia: 88.3% of infected persons investigated eliminated less than 500 eggs/g of stools, none of them more than 3000 eggs. Men, and especially the ones older than 45 years are almost twice as much

affected as women. The preferred strategy is prevention through improved latrine holes (notably concrete walls) and treatment with ferrous salts against anemia and, on a selective basis, mebendazole against hookworm.

Dracunculosis: seems to present no problem. None was found in Bingassi, and only 0.6% of the population of Firia was infected. In the KBK area as a whole there were however several heavily infested villages, mostly in the dry North, with an annual incidence rate of up to 25%. Since it affects mostly the male adult labor force with an average of 54 days invalidity period, it may present nevertheless an important loss of productivity in certain villages. The newly constructed wells with a surrounding wall and concrete apron should provide the best prophylaxis in the resettlements. The other intestinal helminths such as teniasis, trichocephalosis, ascariasis, oxyuriasis, and the whipworm are practically absent (prevalence rate between 0.1% and 1.7% for all of them). Amebiasis (*E. histolytica*) was found in 7.7% of the Bingassi and in 14.4% of the Firia population. Of these only 8% presented the hematophageous trophozoites and 92% were cystiform. Giardiasis (99.8% cyst form) was found in 7.3% of the Bingassi and 6% of the Firia population.

Sleeping sickness: amongst 2695 serological exams only one child presented with specific immunofluorescence and hemagglutination antibodies. Although the tsetse fly species abound, most of them are of the *Glossinia morsitans submorsitans* type which transmits animal trypanosomiasis. However, the trypanosomiasis epidemiology amongst the resettled population is largely unknown.

B. INFECTIOUS DISEASES

Whereas most parasitic diseases can be effectively controlled by vertical programs such as vector control, mass prophylaxis and treatment, the epidemiology of infectious diseases remains largely a medical, sanitary and nutritional problem. Thus although infectious disease conditions in the present and in future resettlement areas are probably the same (with some exceptions such as a rise in venereal diseases during the construction period) clean water supply, immunization programs, and proper treatment will reduce incidence rates in the newly villages who benefit from those interventions.

Measles: It is the first cause of mortality in children between 1-8 years with a highly age specific and uneven geographical distribution. Non-existent before age 6 months (maternal antibody protection), it builds up rapidly after 9 months of age by reaching the 4th place in infant mortality after malaria, respiratory tract infections, and diarrheas. Between age 1-4 y it is responsible for one third of all deaths, (with a case

fatality rate of 25%). Surprisingly it is still very high amongst the 5-9 years old children, namely 28% of all deaths). This and the highly uneven geographical distribution, which varies of course from year to year (a typical measles epidemic in a village of 500 people has an average "build up" period of 7 years) is mainly due to the isolation of villages and hamlets. Firia for example presented 50% measles antibodies in the 1-9 years age group, whereas Bingassi had only 5.8% during the 1981 KBK survey. Measles immunization, possibly beyond the otherwise recommended age of 2 years during the first vaccination year is therefore imperative.

Tuberculosis (TB): TB indices are very low, compared to other LCD's, despite a mediocre BCG immunization coverage of 39% of the total population and a positive FPD (purified protein derivate) rate of 28% amongst the ones vaccinated in the 1971/72 campaign. Annual incidence rate is 80/100.000 pop and in the entire KBK area only 2 TB positive sputa were found.

Leprosy: Much more common than TB, leprosy has a prevalence rate of 1.9% of the KBK population which is almost twice the rate of Mali in general. Rare in children, it is present in 2.5% of young adults and in 4.2% of the population beyond 45 years.

Venereal diseases: Gonorrhoea, by far the most widely spread adult bacterial disease encountered in Malian facilities, has unfortunately not been evaluated in the KBK. A sharp rise of this disease can be expected due to the huge labor force, (German construction workers expect a population of up to 15.000 with all their dependents) who are almost entirely from the outside and relatively high income earners. Treponemal disease (Syphilis, Yaws, Bejel), antibodies were found in 11% of the KBK population. Bingassi with 16.3% and Firia with 14.3% had by far the highest prevalence rates. The quasi absence of positive serology and clinical Bejel amongst the population below 15 y suggest mostly sexually transmitted treponemal diseases. Widespread availability of treatment is the answer.

Salmonellosis: Agglutinine H seropositivity was around 20% of the population for both Bingassi and Firia. Although this test remains positive for several years, it nevertheless suggests that fecal contamination presents a high risk in this area. Properly constructed wells away from defecation sites will reduce its incidence.

Hepatitis (B): 8% of the total KBK population had positive HB antigens. That high figure explains that liver cirrhosis and hepatoma are, according to official health statistics in Mali, the first cause of adult male mortality. Although generally well

tolerated clinically, 15% of the seropositives had abnormal transaminases. 18.2% of the adult population gave a history of icterus, of whose 2.6% presented with hepatomegaly and 2.2% with hepatosplenomegaly. These are all very well high figures. The newly developed specific hepatitis B vaccine (Institut Pasteur) should therefore be included in immunization campaigns (similar to Yellow fever).

Tetanus: Although difficult to evaluate in a cross sectional study, neonatal tetanus is believed to be the nr. one perinatal (6 weeks after birth) mortality cause which kills about 25% of all infants of that age. Immunization of the pregnant mothers with tet. toxoid is the answer.

Whooping cough: Prevalence rate during the survey was low (0.5% of children below 5 y). This figure might be misleading, however, especially since the mothers seemed to recall pertussis episodes as high as 80% of the under two years children in some villages.

Poliomyelitis: 0.4% of all the KBK population presented with paralysis and the annual incidence rate is estimated at 16/1000 people. Most paralysees occur before age 2. This rather high figure is well justifying an immunization program.

Meningitis: Situated within the meningitis belt, its mortality rate is estimated at 1.7% before age 15 and ranks fifth amongst the mortality cases between 1-9 years of age. The last major epidemic in the area was in 1970.

Streptococcal infections: 2.6% of children below age 4 and 1% of the children 5-14 presented with soar throat or tonsillitis. Although no throat swabs were done, streptococcal infections can be assumed in many cases. Without proper treatment, valvular cardiology and glomerulonephritis will be frequent consequences.

C. NUTRITION

No adult malnutrition was observed although the "slimness rates" were quite high: 58.3% of adults had a height/weight deficit of between 10% and 20%. 21.5% of more than 20% deficit. Severe obesity was found and moderate obesity was present in 1.5% of all cases examined (all adults). This picture changes dramatically amongst the under fives, notably around the age of 3 y: the problem of appropriate standards and definitions became apparent: 71% of all children between 1-4 y were below 80% of the Harvard (weight for age) standard; according to the Waterloo classification 51.8% of this age group had protein malnutrition (PEM) of which 54.5% were of the chronic type (weight for age deficiency) and 45.5% acute (weight for age deficiency), the

problem of attaining the exact age was not revealed.

Clinical (i.e. clinically recognizable) malnutrition was found in 7% of all 948 children below age 10 who presented themselves at the health examination points. Most of it were marasms with only 1 case of Kwashiorkor. It is our opinion that the only way to improve that malnutrition pattern amongst the "at risk" group of around 3 years of age, will be the availability of a variety of tasty high nutrient food and preventive and curative health measurements. The high measles epidemiology (see above) might contribute more to this malnutrition rate than the lack of staple food.

Avitaminoses: are extremely rare (1 case of vit. A, 2 cases of vit. B deficiency) in all the KBK area.

Goiter: by contrast, is a major health problem, 29% of the surveyed KBK population presented with goiter; prevalence rates for Bingassi were 24.4% and for Firia 26.1%. As elsewhere, young adult women have the most voluminous ones. Although myxoedema was only present in 0.5% of the goiter population, the achilles tendon reflexogram was prolonged in 19.7% of the population, thus suggesting a huge if not the major proportion of hypothyroid goiters. The underlying reason is of course lack of iodine in their diet, especially its very low concentration in their drinking water. The answer to this lies in the provision of iodized cooking salt which should be commercially available and the population sensitized to its use.

Hemoglobinopathies: 2.9% of all KBK area newborns were estimated to present SS sickle cell anemia and 0.5% the SH type. 8.5% of the 2500 testsera had a G6PD deficiency with no apparent protective association with malaria. Although well tolerated, an 8.5% G6PD deficiency demands nevertheless a prudent approach to folic acid deprivants such as pyrimethamine as a malaria prophylactic agent and some sulfonamides. Since most hemoglobinopathies do not lead to splenomegalies (at least not at an age beyond 5 years), most of the 15.5% spleen index is probably attributed to malaria, and, in exceptional cases, to schistosomiasis (see above).

Other diseases: The KBK survey revealed a host of other diseases, which, although mostly much more elevated than in developed countries, were thought to be of minor importance in the survey area: cardiopathies: 2.5%; arterial hypertension (above 160/90 mm Hg): 6%; Bronchopneumonia ranks fourth in mortality of children below 10 years of age; diabetes (all of the juvenile type), about 2%; infantile diarrhea: 20.4%; hernias (17.2% of all children under age 5 had an umbilical hernia); hydrocele (4.5% of adult males under age 45, 12.4% of males above

45 y); 19.8% of fertile age women presented gynecological infections, of which 95% were a vaginitis or cervicitis and 5% an endometritis or salpingitis. (The gynecological infection rate in Firia reached 29.5% of all women age 14-45 y); dental caries amongst fertile age women compared to men, thus suggesting the mineral deprivation due to frequent pregnancies; chronic ear discharge: 2%, deafness: 0.4%, etc.

Summary

The overall picture is that of a typical LDC population without access to modern medical care and in a very low socio-economic environment. In addition, there are some "tropical" vector borne diseases of which at present mainly malaria and onchocerciasis in some areas represent a major health problem. The only significant change to be expected in the resettled areas will be for schistosomiasis. The rest will probably remain largely the same. Health interventions, therefore, should be more of a basic health service type offering immunization, some health education, and a broad range of relatively simple curative services, and the construction of proper wells.

7.7.3. EXISTING HEALTH CARE FACILITIES

At Bamafele, the chief administrative town of the project area, there is a rudimentary health post, the only government health care facility between Mahina 100 kilometers to the north and Kokofata, another rural administrative center located 50 kilometers to the southwest. This consists essentially of four mud houses which are supposed to serve as dispensary, maternity and birth clinic, and pharmacy. The post is staffed by a senior male nurse and a midwife. The equipment is non-existent. Seldom are any drugs available, both because the location of Bamafele is remote--cut off from all but pedestrian, bicycle, or motorbike traffic for several months of the rainy season--and because the government does not have the financial means to offer better.

At Mahina there is a dispensary that is manned by a doctor trained in the Malian medical school. He is assisted by a senior male nurse and a midwife. This facility also suffers from a shortage of supplies and from a lack of maintenance, but a project which will be funded by an International Development Association loan plans to renovate and expand this unit to the status of a hospital.

At Manantali, the construction consortium (ECBM) has built a 580 m² health facility which includes a ten bed hospital with a laboratory, a radiology unit, an intensive care capability, a pharmacy, a surgical operating theater, a morgue, and lodging for one physician and three nurses. Two completely equipped ambulances attached to the hospital serve as mobile units. Although intended exclusively for the provision of health care to

the expatriate work force and the UMVS representatives during the period of the dam construction, this facility will be turned over to the government when the dam is completed and the expatriates depart.

At the adjacent settlement built to lodge the African work force, a dispensary 130 m² in area has been constructed and serves about 1000 workers and their families for routine needs. For more complicated, non-emergency requirements such as surgery, people are obliged to travel to Mahina. This dispensary will also be turned over to the government in 1988.

In addition, a mini-onchocerciasis program operates at Manantali. This is staffed by a senior entomologist, two technicians, and a driver. A 100 m² office building with a laboratory and storerooms has been constructed for the personnel. A modern house has been provided for the entomologist. This program, started in 1982 with UNDP funding, treats some 25 simulium breeding sites with a weekly dose of Abate (Temephos) over an area from Diba 80 kilometers upstream to Dilia which is about 70 kilometers downstream. This program is primarily intended to protect the construction force. It is currently funded into 1985 but will likely continue until construction is completed.

7.7.4. PROPOSED HEALTH COMPONENT ACTIVITIES

The activities proposed in this analysis have been conceived with the recognition that the project is not developmental in nature and with the very limited purpose in mind: the relocation of people with as little personal loss as possible. Our intent, therefore, is to minimize financial investments to the extent feasible. At the same time, we recognize the need to provide a basic physical infrastructure to enable the Malian government to afford its citizens--in this case, the people being forced to relocate--access to minimal health care during the period of severe stress that the resettlement will generate. Further, we posit that certain baseline data will have to be collected so that the effects of the relocation can be measured. We emphasize, however, that no long term assistance to the development of the government's public health care capability in the Bafing river valley is proposed in this component.

A. PROVISION OF HEALTH CARE FACILITIES

Note that this section should be read in conjunction with Section 7.2.6. which describes the provision of physical infrastructure for government administrative and social services.

The health facility at Bamofele will be flooded and lost when the reservoir fills. Thus, replacement of the health care facility will be financed by USAID funds. Because the present facility is conceded to be inadequate, USAID will upgrade the infrastructure by constructing more durable buildings. They will have sturdy foundations of heavy stone with cement mortar, walls

of cement block, and roofs of corrugated metal sheeting over steel trusses and purlins.

Bamafele will be relocated in Zone 1, downstream of the dam and adjacent to the new access road which links Manantali with Mahina and the railroad. New Bamafele will become a major center in the Rafing valley with the largest concentration of people in the area. A number of other villages will also be resettled in the same zone. While it is true that the health care facilities located at the dam construction site will eventually be turned over to the government, these are located 25-30 km south of Zone 1. With the people to be resettled in this zone added to those who already inhabit the area, the population should number 12,000-15,000 within a 15 kilometer radius. This is enough of a concentration to justify the provision of government health services. Therefore, at New Bamafele, the project will finance the construction of:

- a 75 m2 dispensary
- a 170 m2 maternity clinic
- a 115 m2 pharmacy outlet
- a 55 m2 house for the senior health staffer

The resettlement in Zone 4 called Tintioulen will also regroup several villages in a loose amalgamation. Project analyst posit that this location on the eastern shore of the reservoir will become the major town in this area. Improved tracks and the class B road financed by the WorldBank in an earlier development loan will link this settlement with Kita and the railroad. This Zones 1 and 3 by the filling of the reservoir. To serve the needs of this grouping, a satellite health post of 55 m2 will be built. It will not be permanently staffed during the project but will receive regular visits from personnel based at New Bamafele or Kokofata.

All of these buildings will be constructed to the standard plans used by each ministry. The designs are simple but functional.

Project financing will also equip and furnish all the facilities with the standard items contained in the commodities list drawn up jointly by the Ministry of Health, the USAID Sahel Development Planning Team health advisor, and the USAID/Bamako health advisor. This list consists essentially of basic items recommended by WHO.

The GRM will finance an initial stock of the standard start-up drug supply for the pharmacy. A national drug distribution policy was established following an in-depth, multi-donor study of the pharmaceutical system in 1981. It was decided that pharmacies should operate independently of the health care system and on a profit-making basis, albeit state-run. The pharmacy

financed by the project will be the only one within a sixty kilometer radius of the limits of the resettlement project area.

One month of technical assistance has been programmed to help the GRM set up the furnishings and equipment in the new facilities and get the administrative systems--inventories, records, files--organized.

However, before any disbursement of funds for the preparation of bid documents or for construction contracts, USAID will ask the GRM Ministry of Health to agree in writing to provide personnel for these facilities.

B. EPIDEMIOLOGICAL/NUTRITIONAL SURVEY

The project will finance an extensive survey with the objective of establishing or updating baseline information on the disease epidemiology and the nutritional status of the population in the resettlement zones and adjacent areas.

The epidemiological part of the survey will seek to establish prevalence rates, largely unknown (except for the small amount of data that was furnished by the KBK study), especially for receive a special focus for particular reasons. First, the incidence of schistosomiasis is expected to rise significantly in the area over time, either as the practice of irrigated cropping specialists occurs, as happened subsequent to the filling of the reservoir at Selingue. Second, trypanosomiasis prevalence rates in the area are completely unknown. However, due to the new diagnostic ability now installed at the Manantali health facilities, two cases of sleeping sickness were identified among construction employees in January 1984. The incidence of this disease also increased in the Selingue area following the completion of the dam. Moreover, an eminent WHO consultant, a trypanosomiasis expert based at the WHO West Africa trypano research station located at Daloa in the Ivory Coast, Pierre CATTAND, (Trypanosomiasis Research Laboratory - WHO - B.P 1425), estimates sero-positivity prevalence rates as high as 5% in the Manantali area. Without treatment, this disease is fatal.

For these reasons and because the UNDP program at Manantali is focused on onchocerciasis, the survey will concentrate its efforts on schistosomiasis and trypanosomiasis.

The epidemiological survey should be carried out by the trained personnel of the National Public Health Research Institute. Technical guidance for the schistosomiasis part of the survey will be available from the West German team attached to the institute which specializes in the epidemiology of that disease. The WHO trypanosomiasis specialist at Daloa should be asked to provide guidance and training to the team that investigates the trypano epidemiology. If for any reason the NPHRI cannot carry out the survey, the GRM medical school is capable of doing it with the assistance of the French specialists who are on the staff.

BEST AVAILABLE DOCUMENT

The survey is intended to cover the entire population in the project area--some 10,000 to 11,000 people--but it is likely that not everyone will be reached. Initial efforts will be devoted to verifying the census information already amassed by the resettlement project staff, that is, the Master Settler List. Files will then be created for individual family households to establish the basis for future epidemiological investigation or monitoring. The population will be screened for schistosoma hematobium eggs in the urine. Since current prevalence rates are estimated at 5%, the sample size for the urinalysis should comprise at least 80% of the population. To determine the prevalence rates for schistosoma mansoni--which generally has a prevalence rate only one tenth that of schistosoma hematobium but is technically much more difficult to detect--a large sample of the school-age population will undergo stool examination.

To determine the prevalence of trypanosomiasis, selection by serology for everybody (using the Smith-Cline V.CATT) will be the first task of the field teams, followed by a parasitology exam (gland palpation plus examination) for maximally 2000 people, a blood exam (using the mini-Anion Exchange Centrifugation Technique) for maximally 1000 people, and a CSF (cerebrospinal fluid) for maximally 200 people. The latter exams will have to be done either at the Manantali facility or at Mahina, where facilities for it exist.

At the same time that the epidemiological survey is executed, it is proposed that positive identifications of all cases of both diseases be treated. For schistosomiasis, this will amount to a single dose of praziquantel (biltricide). For trypanosomiasis, this will require a treatment extending over 25 days and consisting of a single dose of pentamidine, nine doses of melarsoprol, and cortisones taken over 21 days. The treatment will have to be administered either at the Manantali hospital or at the "hyproserie" in Mahina, which will require patient cooperation and consent to remain there for the duration.

Two teams should be fielded for the epidemiological survey. Each team should consist of 3 microscopists, 3 nurses, 2 technicians to update demographic information (if necessary), 1 technician to dispense drugs, 1 aide, a driver, a cook, and a cook's helper. These personnel should be contracted for the specific period of the survey if they prove to unavailable from the national institute (INRSP).

In addition, there should be a supervisory team composed of a senior experienced epidemiologist, a physician with experience conducting field surveys, 2 senior nurses, an efficient secretary, an aide, and a driver. The epidemiologist should be contracted for a period of four months with technical assistance funds. This team should move from site to site to help the field personnel as necessary and to oversee the survey.

BEST AVAILABLE DOCUMENT

To help the institute design the survey, plan the field execution, and process the data, three months of technical assistance has been budgeted. This will cover one month of the services of an expert in epidemiological survey design and logistical planning and two months of the services of a computer programmer/data analysis specialist to help design survey forms and assist with both entering and analyzing the information.

The project will finance the transportation costs of mobilizing the teams and moving them throughout the project area. This can be accomplished either by renting the necessary vehicles or by purchasing them. It is assumed that three all-terrain vehicles, one mobile lab, and at least a five-ton capacity truck will be needed to move personnel and equipment. It is proposed that the project finance the purchase of the mobile lab, estimated to cost \$23,000, and rent the other vehicles for the period of the survey, that is, four months. The lab will then be retained by the institute to be used in future survey or monitoring efforts.

C. VILLAGE RELOCATION POLICY

Health specialists have sought to assist the project planners in the choice of sites for the relocation of villages. Thus, among the many attributes of potential new sites that were considered, the environmental effects on the health of the population was of major importance.

According to onchocerciasis experts based both at Bamako and at Manantali, the flying range for the *simulium damnosum* species is normally limited to about two kilometers. The health specialists were instrumental in establishing the policy of resettling villages at least two kilometers away from known or potential *simulium* larvae breeding sites. Project planners have succeeded to date in programming almost all village moves to locations that pose no risk.

Moreover, the project will seek to layout new villages to enhance conditions of sanitation. Concessions will be located further apart and situated to facilitate the drainage of rain. The project budget also includes funds to pay for the digging of at least one latrine in each family concession. This will be an improvement over the current situation.

7.7.5 *ESTIMATED COSTS

7.7.5.1 EPIDEMIOLOGICAL/NUTRITIONAL SURVEY

	FY84	FY85	FY86	FY87	FY88	TOTALS
**FIELD PERSONNEL (2 teams)	-	4	-	-	-	4
4 microscopists (4pm)	-	4	-	-	-	4
4 nurses (4 pm)	-	4	-	-	-	4
4 drug dispensers (4 pm)	-	4	-	-	-	4
4 scribes (4 pm)	-	4	-	-	-	4
2 aides (4 pm)	-	2	-	-	-	2
2 drivers (4 pm)	-	2	-	-	-	2
2 cooks (4 pm)	-	2	-	-	-	2
2 cooks' aides (4 pm)	-	1	-	-	-	1
2 watchmen (4 pm)	-	1	-	-	-	1
***SUPERVISORY/PLANNING PERSONNEL						
1 epidemiologist (4 pm TA)	-	60	-	-	-	60
1 epidemiology survey designer/ planner (1 pm TA)	-	15	-	-	-	15
1 WHO trypanosomiasis specialist (1 pm)	-	4	-	-	-	4
1 physician (4 pm)	-	4	-	-	-	4
1 computer programmer/ survey designer/data analyst (2 pm TA)	-	30	-	-	-	30
2 senior nurses (4 pm)	-	4	-	-	-	4
1 aide (4 pm)	-	1	-	-	-	1
1 secretary (4 pm)	-	1	-	-	-	1
COMMODITIES						
Camping equipment (cots, sleeping bags, tents, tables, chairs, lamps, nets, kitchen utensils, 2 generators, 2 freezers, 2 refrigerators	-	18	-	-	-	18
Laboratory equipment						
4 microscopes						
1 PATH schisto kit						
1 CATT team set						
1000 extra filter holders						
8 units of extra gaskets						
28 boxes slides 25x75mm						
2 rolls Kato cover cellophane						
20,000 plastic bags						
200 10 ml syringes, Luer Slip						
8 bathroom scales						

	FY84	FY85	FY86	FY87	FY88	TOTALS
4 baby scales						
4 heigh sticks						
4 heighthboards						
12 plastic buckets						
50 pairs plastic gloves		18	-	-	-	18
Office equipment/supplies						
2 file cabinets						
5000 file folders						
100 hanging files						
1 photocopier						
2 Compaq computers w/ software						
2 Epson MX 100 printers						
miscellaneous supplies		14	-	-	-	14
Vehicles						
1 Mobile laboratory		23	-	-	-	23
Drugs						
Praziquantel (2000 doses 500)						
Pentamidine (200 doses)						
Melacsoprol (1800 doses)						
Cortisone (4200 doses)		9	-	-	-	9
****OTHER						
Vehicle rental (4 months)						
4 All terrain		16				16
Fuel (10,000 liters)		7				7
(SUBTOTAL)		(254)				(254)
7.7.5.2 INFRASTRUCTURE EQUIPMENT/FURNISHINGS/TECHNICAL ASSISTANCE						
Dispensary	-	0	-	-	-	6
Maternity	-	30	-	-	-	30
Pharmacy	-	5	-	-	-	5
Health outpost	-	3	-	-	-	3
Technical Assistance						
(1 pm to help set up equipment and furnishings and establish inventory and records systems)		-	15	-	-	15
(SUBTOTAL)		-	(59)	-	-	(59)
Inflation (7% compounded)	18	8	-	-	-	26
Contingency (15%)	41	10	-	-	-	51
TOTAL	313	77	-	-	-	390

* Does not include construction costs which may be seen both in the detailed project budget and the engineering analysis.

** Includes both salaries and per diem costs where applicable but assumption is that civil service personnel will serve on the planning and supervisory team and that field team personnel will be contracted.

*** Includes two round trip plane tickets and per diem but no salary or fee for two consultative visits by the WHO trypanosomiasis expert based in the Ivory Coast at Daloa.

**** Does not include rental fee for 5-10 ton truck to transport equipment from site to site during the epidemiological/nutritional survey. The assumption is that the equipment can be shipped by rail to Mahina. From there the RPU truck can transfer it to the survey zone and move it as necessary.

7.8. ANNEX: MONITORING ANALYSIS

7.8.1. INTRODUCTION

7.8.2. GOALS OF THE MONITORING UNIT

- A. Monitoring
- B. Participation in Management and Liaison
- C. Evaluation

7.8.3. ANTICIPATED PROBLEM AREAS

A. Problems Related to Dam Construction

- 1. Demography
- 2. Economic Changes
- 3. Health

B. Long-Term Impacts

7.8.4. INFORMATION NEEDS

A. Baseline Informatio

- 1. The UNDP Studies
- 2. Assessment of th
- 3. Other Studies

B. Monitc

1. Indicators

- a) Demographic
- b) Economic
- c) Health
- d) Perceptions of the Population
- e) Re-Establishment of the Production System
- f) Water Availability
- g) Increased Population Density
- h) Political, Including Long-Term Reallocation of Farm Lands
- i) Infrastructure
- j) Perceptions of the Population
- k) Scheduling of Project Activities

2. In-Depth Studies

- a) Production Systems

- b) Political Leadership
- c) Increasing Population Density
- d) Network Study
- e) Women
- f) Cultural History and Archeology

7.8.5. ORGANIZATION OF THE MONITORING UNIT

A. Data Collection

- 1. Indicators
- 2. In-Depth Studies

B. Data Analysis

C. Data Presentation

- 1. Interim Reports
- 2. Final Report

D. Staffing

- 1. Director
- 2. Assistant to the Director
- 3. Interviewers
- 4. Field Researchers for In-Depth Studies
- 5. Technical Assistance

7.8.6. BUDGET

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7.8 MONITORING PLAN

7.8.1. INTRODUCTION

The Monitoring Unit has been designed in light of the goals of the Manantali Resettlement Project. The primary goal of the project is to resettle the population in a way that they can re-establish the quality of life and level of economic activity that is presently theirs.

Although the project does not include economic development objectives per se, an important secondary project goal is to enable the local population to take advantage of regional economic development activities in a least cost manner.

Following is a plan for a project monitoring unit. Since a plan must be formulated in light of its goals and the situation to be monitored, a section on goals (Section II) and an analysis of the problems (Section III) precedes the presentation of the information to be collected (Section IV) and organizational and personnel needs (Section V).

7.8.2. GOALS OF THE MONITORING UNIT

The primary goal of the monitoring unit is to aid project management in ensuring that resettled villagers can and do re-establish their economic and social quality of life. A subsidiary goal is to facilitate villagers' ability to take advantage of economic development opportunities.

The means by which the monitoring unit does this is through gathering information on the population in the area and using that information to better plan, implement and when necessary, suggest changes in project activities. The monitoring unit should work in close collaboration with project management to ensure that data gathered by the unit are taken into consideration in project decision making.

In light of these goals and means, 3 major activities of a monitoring unit can be delineated: monitoring, participation in management, and evaluation. While these activities may overlap in the day-to-day functioning of the unit, they are analytically separate:

A. MONITORING

Monitoring involves continued surveillance of project activities to verify that project goals are being met. If project goals are not met, propositions should be made for changes in project organization or activities so that those goals can be better met.

In this project, monitoring should be oriented around the primary question of whether the population is able to re-establish its pre-project quality of life. For reasons to be discussed in more detail below (Section III) the question of "re-establishment" of quality of life is not a simple one since individuals will have a somewhat different mix of resources available to them in the resettlement zones (e.g. quality and quantity of land and water), and since the mere process of resettlement will introduce new stresses into people's lives. Moreover, the presence of a large dam construction site and the changes associated with it will bring major new changes to the region. Thus, monitoring cannot simply address the question of whether village life after resettlement is the same as it was before.

Rather the judgement as to whether or not the quality of life of the population is being maintained as the project progresses is more complex, and the monitoring unit needs to collect several different types of information. First the monitoring component should develop some indicators that "track" in simple and graphic form the characteristics of the population and their changes during the resettlement period. Some of these will be simple and easy to get (e.g. well depths) and others will be more complicated or more difficult to gather (e.g. agricultural production estimates or measures of agricultural diversity). Some suggestions for particular indicators are presented in Section 7.8.4 B.

Despite the usefulness of specific (usually quantitative) indicators, these must be complemented by in-depth studies which produce more qualitative, contextual information. These studies should enable project management to know not only what is happening, but also how and why it is happening. Two types of in-depth monitoring studies can be foreseen. First, there are a number of areas in which problems are already anticipated; these include questions such as the effects of salaried employment on agricultural production, land allocation to new villages, and the assumption of political leadership in new villages. Suggested topics for in-depth studies are presented below in Section 7.3.4 B.

Secondly, a number of unanticipated problems are likely to arise in the course of the project. For some of these, solutions may be obvious. For others, it may be necessary to get more information to find an appropriate solution. The Monitoring Unit should have the ability to plan and execute new studies that may become necessary in the course of the project.

Results of monitoring studies (both indicators and in-depth studies) should be readily available to decision makers. This implies that the Monitoring Unit needs to develop procedures for the analysis and dissemination of data which can be done quickly and thoroughly. Moreover, the unit cannot depend only on formal dissemination of results (e.g. written reports) but needs to develop less formal means of communication. For this reason the second major activity of the Monitoring Unit should be participation in management.

B. PARTICIPATION IN MANAGEMENT AND LIAISON

In order to facilitate the use of monitoring results in project implementation, the director of the Monitoring Unit should have direct input in decision making about project activities. The director should work in close collaboration with the sociological unit more directly charged with implementation (Section Soutien), should have direct access to the director of the Project Management Unit, and should participate in formal meetings of section heads.

In order to facilitate the villagers' ability to take advantage of local economic development opportunity, the Monitoring Unit should also maintain contacts with local development organizations, such as OMVS and ODIPAC. They should communicate villager's needs and possibilities to these organizations as well as letting villagers know of services offered by these organizations.

C. EVALUATION

The final major activity of Monitoring Unit will be to prepare a final evaluation report on the impact of resettlement project. This will not involve the collection of data different from that collected in the monitoring component, but it will use monitoring data for different purposes. There are two major purposes of the final evaluation of the Manantali Resettlement Project.

The first is to provide an analysis of what happened during the resettlement process, how and why it happened, and how it could be encouraged or discouraged from happening in other resettlement projects. The Manantali Resettlement Project will be a precedent for USAID in the area of low cost resettlement and this analysis should assess the feasibility of low cost resettlement projects in others areas as well as provide recommendations for how it can be done more efficiently and equitably.

The second goal is more directly oriented to the Manantali region. Although there is no plan for project funding of economic development intervention after resettlement, there is

an interest in recommendations about how the local population can take advantage of economic development opportunities in the region presented by other projects or organizations, for example OMVS or ODIPAC. Therefore the final evaluation should make specific recommendations about village level development projects through existing economic development organizations.

7.8.3. ANTICIPATED PROBLEM AREAS

The most common type of compulsory resettlement in the developing world is due to dam construction and the creation of reservoirs. Since it is so common, resettlement experts have noted some expected patterns in compulsory relocation. For example: the evidence suggests that compulsory relocation is characterized by increased morbidity and mortality especially for children and elderly; increased psychological stress due to loss of homeland and anxiety about the future; and increased socio-cultural stress often expressed in a reduction of leadership capacity and simplification of the socio-cultural system (Scudder 1981:93). While stresses are great for any settlers, they are greater in compulsory resettlement, due simply to its compulsory character.

Despite the care taken by project personnel throughout this project to resettle people in areas of their choice, one can nevertheless expect to find that the people will undergo considerable amounts of extra stress. Due to these stresses, it can be expected that extra services will be needed simply to maintain their quality of life throughout the resettlement period. In fact, if the quality of services available to the population remains the same as before resettlement, one can expect that their quality of life will decrease rather than be maintained. This section discusses some of the particular stresses that are likely to be encountered by the Manantali population during and after resettlement, and which should be addressed by monitoring studies.

A. PROBLEMS RELATED TO DAM CONSTRUCTION

A certain set of stresses will occur directly due to the dam construction itself. The Manantali region has been one of the most isolated, and least densely populated regions in Mali outside of the Sahara desert.

The process of the dam construction will increase the size and diversity of the local population, as new people arrive to work on the dam, and also as others follow to provide them with goods and services. In the presence of all these new wage earners, the size and value of local marketing will increase enormously in what has been an economy primarily oriented around subsistence. After dam construction however, most of these

strangers and their money will leave, and the area will be left more or less as it was before the dam construction, isolated and distant even from many of the simple goods and services available to many other rural Malians in less isolated areas. While the process of dam construction will lead to one set of stresses, the termination of construction will lead to another set of stresses that will follow it in time. The problem areas that can be directly attributed to dam construction fall into 3 basic areas: demography, economy and health.

1. DEMOGRAPHY

Due to dam reconstruction, the shape of the local market will change and its size will increase dramatically. The dam will employ 150 expatriates and African professionals and 1450 African workers, many of whom will be accompanied by their families. More people will be indirectly employed by a variety of subcontractors and private entrepreneurs have come into the region to offer workers a variety of goods and services.

As the population increases, its composition will change, including such aspects as the proportion of strangers (non-regional, non-Malian and non-African), age-sex pyramids, and patterns of in and out migration. Moreover the changing demographics of the region will directly contribute to the two other problem areas: the economy and health.

2. ECONOMIC CHANGES

Dam construction brings an economy which is commercialized rather than subsistence oriented. The new population earns wages or sells goods and services; this has quickly and directly increased the amount of money available in the region. Moreover, in agreements with OMVS, whereby workers on the dam were to be of all three OMVS nationalities (Malian, Mauritanian, Senegalese), it was also agreed to pay all workers according to Senegalese wage rates, which are approximately twice as high as Malian one. This increases the influx of money beyond that which would be expected were this a purely Malian project.

The price of many goods and services in the region have already risen from village levels to urban prices. For example, in less than a year quoted village room prices have risen from 2500 MF to 5000 MF and quotes of monthly board prices increased from 10,000 MF to 15,000 MF.

The influx of new wealth into the region will undoubtedly have many effects on the villages. In terms of this project, two

are of particular interest. First, the cost of labor will increase. Even though there are already more people looking for jobs than there are jobs available, the example of the dam workers is important and workers are demanding rather high wage rates. Thus, the resettlement project may have problems finding laborers to work at Malian wage rates (e.g. in land clearing) and clearly will have problems finding extra volunteer labor for those tasks to be done primarily by the villagers themselves (e.g. food-for-work for housebuilding)

Due to the increased amounts of salaried work in the region and the participation of locals in it, cash incomes in the resettlement areas will increase but as incomes increase the costs of goods and services is also increasing, especially in those areas where there are limits on the growth of the supply (e.g. land to build housing). It is unclear the extent to which increasing income will be offset by increasing costs. Moreover villagers in resettled areas are likely to lose at least some of their subsistence production during and directly after the move. Thus while an increase in purchasing power for people in the region is likely, it may not be nearly as great as it seems, because of the accompanying increasing costs.

There are also equity issues involved in the question of who will benefit from the increased economic activity. Although resettlement villagers are benefiting from wage labor (350 of the Malian dam workers are from the Bafing), and to some extent from the sale of food to the Manantali population, it is likely that they will benefit relatively less, than the other groups, less even than some neighboring villages. Downstream villages near the dam (e.g. Manantali itself, Bingassi, and Sonfara) rent houses to workers and feed them, and presumably also sell raw agricultural produce. These opportunities are open to a significantly lesser extent to those upstream villagers who need to be resettled because they will be moving in the middle of dam construction. Another set of direct beneficiaries will be those offering goods and services to the Manantali population, e.g. bars, restaurants, prostitutes. The investment required to do this however is greater than that open to the average villager, and impressionistic evidence suggests that the medium to large scale entrepreneurs who have enough resources to be able to profit from investments in those enterprises tend to be outsiders, either merchants whose base is outside of the area, or civil servants who serve in the area but who have resources available to them beyond those available to the average peasant.

Finally, when the dam is finished, most of these new economic opportunities will contract as quickly as they had expanded as both expatriate and local workers go on to other jobs in other areas. A few will remain to operate the dam and the region will ultimately be less isolated due to the improved road from Mahina to Manantali, but it is highly likely that the region as a whole

will return to a primarily subsistence orientation.

One set of monitoring indicators flows directly from these economic changes: e.g. costs of labor, labor availability, costs of basic necessities, mix of subsistence/salaried/self-employed/informal sector workers in the region, the question of who benefits and in what way these benefits will have any long term impact on the resettled population, both during and after dam construction.

3. HEALTH

Another major impact will be on the health of the people in the region. In addition to the stresses of compulsory relocation which will have deleterious health effects, some increase in diseases will come directly from the diseases introduced by new people moving into the region. The Public Health Analysis, for example, notes that venereal diseases will almost surely increase in the region. as many lone male workers come, and prostitutes follow. Another example concerns contact with new germs which had not previously arrived in some of these isolated villages.

The Public Health Analysis notes, for example, that the infection rate of measles (the prime killer of children age 1-8) varies widely from village to village; as villages amalgamate in the resettlement process it is likely that those not exposed to measles previously will now be exposed, and that measles will increase. The reservoir will also bring new opportunities and this may have health implications. For example, another potential disease increase will likely be schistosomiasis, which will enter with Bozo and Somono fishermen who come from elsewhere to exploit the new lake resources, an area where schistosomiasis infection has been rather low (Section 7.7 in Public Health Analysis).

The psychological and physiological stresses associated with moving, as well as the increased disease potential brought by immigrants and amalgamation make it likely that resettlement will lead to deteriorating health in the resettled population. Supplementary health services will be necessary simply to maintain in the resettlement population the same level of health they now have. Monitoring of health and nutritional indicators is important, so that the project management can deal effectively with health problems.

B. LONG-TERM IMPACTS

While the initial set of impacts in the Manantali region are those associated directly with dam construction, the resettled population is likely to face another set of more long-term problems involved with their resettlement in new areas. The technical aspects of these questions are covered elsewhere in this PP; this section will concentrate on some of the

non-technical problems.

The first question concerns whether, in the resettlement zones, the conditions will be good enough to re-establish the diversified agricultural systems which the villagers had before resettlement. As Scudder (1981:212) notes, unoccupied lands are often this way for a reason, including such conditions as lack of water, poor drainage or poor soils. Certain diseases (e.g. here - onchocerciasis) may also be present. Despite the fact that the UNDP financed feasibility studies isolated zones of good soil and water availability, it is not completely clear that the resettlement zones will have all the specific environmental features needed to re-establish the diversified production system of the region.

The present production system uses a large variety of different resources, including cultivated, gathered and hunted foods, and livestock. Agriculture includes annuals as well as perennials (e.g. tree crops), and recession as well as rainfed crops. Thus an individual farmer needs a specific mix of different kinds of lands as well as different kinds of water. One sample problem area concerns water availability. While the resettlement project will verify domestic water supply and dig several village wells, it cannot supply dug wells for each of the many individual gardens owned by the villagers. While the villagers can do this themselves, they need a relatively superficial aquifer. It has not been definitely verified that water will be available for this sort of well. This is only one example, but it illustrates the problem. While the project can predict and plan for the main requirements of production systems, it is not possible to plan for all contingencies and small details. Therefore, the re-establishment of the production system ought to be monitored with special attention paid to the extent to which a diversified, integrated production system is re-established. The section below on indicators will suggest some of the specific possibilities (e.g. number of different kinds of fields and crops).

A related long-term problem has to do with increasing population density. The present production system depends on very low population densities. As soon as a village becomes too large, families create "hameaux de culture" (agricultural hamlets) so that fields are far away from population centers and will not become quickly exhausted. Although the resettlement area has a very low population density at this point, some villages have chosen to amalgamate so they have a better chance to receive certain government services. There is also likely to be concentration of settlers (both resettlers and migrants from other regions) who will move relatively near the dam to take advantage of wage labor and entrepreneurial activities associated with dam construction. While many of the "strangers" will leave when construction is completed, there is still likely to be

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fairly dense concentration of population along the route from Bingassi down to the dam site. In fact, Bamafele, the chief-lieu d'arrondissement, plans to relocate in the region of Bingassi adding to this concentration. While this population concentration may have distinct advantages for the purveyors of goods and services it will likely have distinct disadvantages for those who wish to re-establish their agricultural production. The effects of these population concentrations, over as long a term as possible, ought to be monitored to see to what extent they bring benefits vs. negative effects, and to what extent they lead to changes in the previously existing system of production and exchange in the region.

Another set of impacts to be monitored concerns political changes in the region. Although great care is being taken to allocate land through the proper channels of village chiefs and land chiefs, the Malinke are known for their involvement in land disputes. Thus, despite the approval of all concerned, it cannot be assumed that the allocation of land to resettled villages will proceed without problems. The land question should be monitored carefully. Secondly, the move may well provide an arena for the expression of latent conflict over political leadership. This is particularly true when villages will amalgamate to become quarters of one larger village, but can happen in any village which has rival claimants to formal or informal political leadership. These kinds of questions are difficult to follow with specific indicators, and will require more in-depth studies.

Finally, problems will arise within the context of the move itself. In order to move families and animals in enough time to re-establish new villages before the reservoir is filled, a number of tasks need to be carefully coordinated. Despite efforts to plan and coordinate these separate tasks as carefully as possible, it is likely that events will happen which will upset timing and coordination. The monitoring team should be aware of the planning and scheduling of the move and resettlement and should act in conjunction with the Support Section as liaison between villagers and project management.

7.8.4 INFORMATION NEEDS

A. BASELINE INFORMATION

1. THE UNDP STUDIES

In order to assess what changes have occurred in the Manantali area, it is necessary to have a set of baseline data. The major baseline information comes from the studies financed by UNDP. These include agriculture and soils studies, aerial photography, topography, and hydrogeological studies, but of main interest for the Monitoring Unit are the "agro-socio-economic" studies done by the

Institut d'Economie Rurale (IER). Since the results of these studies are not expected until early September the usefulness of these can only be assessed from a study of the questionnaire forms used and in light of the terms of reference for the studies. When planning their own studies the Monitoring Unit should acquaint themselves with the actual results of the IER studies.

According to the terms of reference for the studies, these studies had several major goals. The first was to get an adequate assessment of the number of people and animals, the number of household structures, the number of fruit trees and the presence of village infrastructure. This is necessary information to plan for the move: i.e. how many people and animals will be moved, how much building material will be needed, how much transport will be needed, and how many immovables will need to be indemnified, in particular, fruit trees. A second goal was to understand some of the social context of the region, e.g., land tenure forms, existing farming systems, the presence of sacred woods and other inhabitable sites, patterns of village level decision making and some appreciation of present revenues and expenditures. Analysis of these results should aid in planning the details of the way in which villagers would be resettled and allocated new land. Third, the IER report should make suggestions on what new infrastructure would be needed in the resettlement areas, possibilities for regrouping villages, and recommendations for involving village level groups and individuals in decisions about the resettlement.

In addition to the studies done in the villages in order to estimate population density in the resettlement region, and to better understand attitudes about accepting the new population. The final report of IER should also analyze the experiences of the Selingue resettlement, to profit from their previous experience.

To gather this information, IER used a staff of three (an agricultural economist, sociologist and zoo-technician, the agricultural economist being team leader) plus thirty interviewers. Due to their reliance on interviewers rather than senior personnel to do much of the actual study, they developed formal questionnaires to gather most of the information. Despite some problems with this format to be discussed below, it is easy to see from the forms that they have adhered very closely to the terms of reference, developing sets of questions which correspond closely to each of the individual tasks delineated. No systematic informal questioning was done to supplement these forms, although the senior staff spent time working in the field. The final terms of reference called for minimal time in the field, approximately 6 weeks (of 26 total) which included interviewer recruitment and training as well as the actual study. However IER reports that they actually spent 9-10 weeks in the field.

Tasks were primarily divided along disciplinary lines. The

agricultural economist designed forms and collected information on agriculture, including its socio-economic context. The zoo-technician concentrated on the animal census, and the sociologist on the demographic census, land tenure, village infrastructure, and decision making patterns. In addition a census of all physical structures was done.

Samples were of three major types. First there were global censuses: of people in both sending and receiving areas, of fruit trees, physical structures, and animals. These were done for every Unit of Agricultural Production (farm household) in the region in order to get a complete count. Further information was gathered on samples only; approximately 80 families were sampled. Questionnaire forms were particularly developed for agriculture and concerned cropping patterns, harvests, labor use, field sizes, and commercialization. A supplementary study was prepared for women. A sample of the structures was also evaluated as to their size, the quantity of materials used, and their value. Further information was taken on the demographic patterns of some of the livestock in the region as well as information on livestock disease and feeding patterns.

A third set of information, primarily sociological, was gathered on the village level. This primarily was information about village level infrastructure (schools, dispensaries, wells, livestock pens, religious sites, etc.) as well as historical information on the village, village associations and their role, and land tenure and land use patterns. Villages in both sending and receiving areas were questioned about what they had already heard about the dam project and how they had received this information. Receiving villagers were questioned about their willingness to receive resettling villagers and their present relationships to them. Resettling villagers were questioned about their preferences for resettlement sites, their preferences for forms of organization in the resettlement zones.

2. ASSESSMENT OF THE UNDP STUDIES

Since the report of the results is not yet available it is difficult to assess the utility of this information, but nevertheless a preliminary assessment can be made, on the basis of the questions which were asked.

In terms of baseline information, the most useful information will likely be that contained in the census results. Although it is likely much of this census information is underestimated because of people's perceptions of tax implications, it is nevertheless a set of factual data about the population of the region that will provide some of the basic characteristics of that population. Since it required specific concrete responses on the part of individuals, this kind of information is less open to differing interpretations than are more attitudinal,

value-oriented questions. This information is necessary for planning as well as providing baseline information for monitoring.

Despite the utility and value of this information per se, the following recommendations can be made to supplement it. First, each village should be recensused directly before it will actually move. The main reason to do this is to discover any changes that have occurred since the original census was done in spring of 1983, nearly 2 years before some of the villages move. While the number of physical constructions and trees will likely be similar, significant changes in the demography of both humans and animals is likely. Secondly, as villagers begin to perceive that their indemnities for fruit trees and the amount of construction materials received depend on an accurate census of their goods, they may be more accurate in their responses.

Secondly, if possible, IER should turn over not only a report, but the original questionnaire forms to the Resettlement Project Unit. While it is likely they will do as complete an analysis of information as possible, it would be useful if the monitoring and evaluation unit could return to the initial responses if they need to have further baseline information. This is especially true for census forms, which list the villages' inhabitants.

The more detailed information gathered about agriculture and livestock in the samples of 80 families is more likely to be subject to error. For example, much of the agricultural information asked for (e.g., exact number of fields for different family members, actual income from sale of agricultural produce, actual quantities of inputs used and produce harvested) is known to be difficult to get on a single interview. People are neither used to estimating these specific quantities, nor are they necessarily willing to give this information to an outsider if they do know it. While this data may be useful for giving some very general ideas about the agricultural system, it should not be used to understand specific patterns (or the extent of variation in those patterns) in the region. Numbers of fields, for example, are almost surely underestimated. In general the complexity of the production is likely to be underestimated (e.g. integration of farming and craft activities, variation in men's and women's fields). IER admits that their information on income and commercialization is weak, and there has been no systematic information gathered on off farm activities and income, a known important source of cash in the region. However this information may still be useful for monitoring. Given that we expect results to be biased toward showing less complexity and lower quantities than actually exist, if monitoring studies show even worse conditions, this would clearly indicate lower standards of living.

The same problems exist concerning the livestock sample. Accurate livestock information is known to be especially difficult to get, and there is no reason to believe that the

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Manantali situation will be any different.

The village level sociological studies have their own set of problems. The most useful part of this will be the physical inventory information on village infrastructure. The opinion and attitude questions, as well as the general information on land tenure, will likely be less useful. The way in which these questions were posed gave little time for answers in depth, and interviewers often recorded simple yes/no responses. The answers will primarily reflect cultural ideals, and it is not likely that specific problem areas, intra-village tensions or potential areas for conflict, or even inter-village variation will be uncovered. Meanwhile those general ideal patterns of land tenure and inter-village relationships that are likely to be shown by the questionnaires are already known. The attitudes of the receiving villages and the resettling villages toward potential new sites have been discussed for the past two years with both GRM and AID personnel working on the resettlement, and it is unlikely that the IER studies will add much to what is already known by them. Perusal of GRM and AID documents will probably be more useful to Monitoring Unit in establishing baseline information on this subject than will the IER studies.

Despite the problems inherent in the IER studies, it is not recommended to re-do any of these studies, except for the census information which is mentioned above. Many of the problems of these studies stem directly from the single interview nature of the interviewing done, and it is unlikely that any baseline study would be done any differently. Rather the monitoring units should selectively choose from that IER information that seems to be the most accurate and useful; this would concern those kinds of studies that count/describe specific concrete information, in particular, the different kinds of census questionnaires, both at the family and village level.

The one area in which baseline data are clearly lacking is health and nutrition. A short form based on some of the health and nutrition indicators suggested below should be administered in conjunction with the schistosomiasis survey proposed in the Public Health Analysis. This would be the most efficient way of getting baseline health and nutrition information.

3. OTHER STUDIES

Although the main baseline information will be contained in the reports of the UNDP studies, there are some other sources of baseline information available. The most comprehensive is the feasibility study done by the Groupement Manantali for OMVS, "Etude d'Execution du Barrage et de l'Usine Hydroelectrique de Manantali, Mission A.1.14 Recasement des Populations." While many of their suggestions for resettlement have been superseded, the general social/cultural context of the region is well

presented, and the study contains some useful comparative demographic information.

An Italian group was in the region in July 1983 to do a feasibility study of 3,000 ha. for experimental irrigated perimeters on the Bafing between Manantali and Bafoulabe. This was done in conjunction with IER and the report should appear shortly. In addition to extra information, this may also be a way of creating lines with other development projects in the area.

ODIPAC (Office de Developpement Integre pour la Production Arachidiere et Cerealiere) has been doing a study with the aid of IER's Division de Planification et Evaluation throughout the area they serve, including a part of the sub-sector of Bamafele. Results of this study, not yet available, should be obtained through ODIPAC, and will primarily concern agriculture.

General background information can be obtained from writings on the Malinke including the studies on the Kita region done by Purdue University, available at USAID. Although useful for general background, care should be taken in using these, as they do not concern the Manantali region specifically.

B. MONITORING NEEDS

Basic monitoring needs should be of two types. First, a number of specific indicators should be developed. They should be valid indicators that reflect those characteristics that they are meant to measure. They must also be simple; this means they must be simply collected, simply tabulated and analyzed, and most importantly simply interpreted to the other resettlement units. A simple method of tabulation analysis and interpretation is important so that the communication of project management and monitoring unit is efficient and without serious delay.

However, indicators are not enough to understand in detail the social processes in the region. Therefore they must be supplemented by in-depth studies of some of the problem areas that are likely to appear in the process of project implementation.

These two different types of monitoring studies will be discussed separately. First the indicators will be discussed, and this will be followed by some proposed in-depth studies.

1. INDICATORS

The following section presents a list of indicators some of which may be useful in determining whether and to what extent the resettlement population is able to re-establish their existing quality of life. The following list should not be taken as a detailed prescription for the Monitoring Unit; rather it is illustrative. The monitoring team will likely want to delete

some and add others. As new problem areas surface or are permanently resolved, indicators may be added or deleted. The list of indicators follows the problem areas presented above.

Indicators associated with the actual process of dam construction include the following:

a) Demographic population size

breakdown by age/sex
percentage of in-migrants
percentage of out-migrants from
among resettled villagers
proportion local/non-local population
time use/work patterns for men,
women and children

b) Economic

proportion salaried/non-salaried
workers
daily wage rates (non-
agricultural, agricultural
income per unit from the sale of
basic services, agricultural
produce
costs for housing, monthly food
if a renter, costs of basic
food items (grains, peanuts,
meat, fish) and other basic
consumption items (wood,
batteries, soap, etc.)
estimates of monthly incomes for
settler families

c) Health

weights for height for group most
at risk (children from 65-115
cm. in height - approximately
6 mos. to 6 years)
simple food consumption survey
(stressing diversity and types
of food eaten rather than
quantities)
information on disease rates
gained from dispensary records,
pharmacy records, or other
relevant secondary source
information

d) Perceptions of
the Population

this must be developed in the
field, but should concern
villagers' own assessments

of the economic/social/
health costs and benefits of
the dam construction

Indicators more oriented to long-term resettlement processes
include the following:

e) Re-establishment
of the Production
System

Agriculture

absolute number of fields per
family and per person
including fields of women
and dependent men
diversity of different kinds of
crops grown
number of rainfed vs. flood
recession vs. irrigated
fields
number of trees re-established
quantity of gathered foods
inputs and equipment used
amount of produce sold, unit
price and total income

Stock Raising

numbers of animals, birth and
death rates

Fishing

amount of fish caught/sold

Off-Farm Income

new off-farm income associated
with dam construction is
collected in section b)
Economic
craft activities (amounts,
kinds, and income and amount
used for self-consumption or
sale) for men and women
off-farm income earning
activities (e.g. gold
mining, seasonal agricul-
tural labor) income earned
for men and women

f) Water Availability

well depth by season
no. of wells put in, including
dug wells done by villagers
quantity of daily household
water used, by uses
amount of waiting time to get
water

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- g) Increased Population Density
the same indicators suggested under a) Demography would be useful
- h) Political, including long-term reallocation of farm lands
number and kind of land disputes
number and kind of disputes over political leadership
re-establishment/activities of local associations, including both men's and women's associations
no. of activities done, kinds of activities done by village associations
- i) Infrastructure
re-establishment of schools (no. of classes)
accessibility of old, new roads
number of, use of industry, services, markets
- j) Perceptions of the Population
as on the earlier section, villagers should also develop their own assessments of the long-term consequences of resettlement
- k) Scheduling of Project Activities
the Monitoring Unit should be aware of target dates for the completion of specific project activities; they should develop indicators to monitor villagers' ability to meet their project commitments; if villagers cannot, they should work with the Monitoring Unit to develop changes in the implementation plan so tasks can be completed in a timely fashion

2. IN-DEPTH STUDIES

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While a series of indicators can be very useful as a simple and graphic way of charting project progress, they cannot explain how or why these changes are occurring. Indicators need to be complemented by a series of more in-depth studies which are oriented toward understanding how and why some of the more complex changes are occurring, and then, how some of the problems associated with these changes can be solved. The following are some suggestions for long-term studies, which stem from the earlier discussion of likely problems.

a) Production Systems: While this would mainly involve a study of agriculture and land tenure, it should also include an assessment of the changes in the mix of agriculture and other productive activities (livestock, fishing, gathering and hunting), and some discussion of the relationship between on-farm food production activities, craft production within the household and off-farm earning activities. Attention should be paid to how families decide on a certain mix of activities, in light of the resources presented to them.

b) Political Leadership: Land tenure and land disputes should be looked at again here, but from a political rather than a production point of view. During compulsory relocation it can be expected that the internal political alignments and tensions may express themselves and political alignments may change. Also, attention should be paid to group activities and mobilization at a village level, including the possibilities of these groups to undertake (primarily self-help) economic development activities.

c) Increasing Population Density, especially along the access road from Bingassi to Manantali. Special attention ought to be paid to any effects of perceived increasing density, any difficulties this causes in agriculture, and any other changes which result. Does the increased availability of goods and services compensate for any problems in agricultural production? Does the mix of crops change as people grow more for sale in a small urban center? Does agriculture intensify if the return to it goes up? Or rather will the inhabitants simply disperse again into hamlets when the short term boom of the dam construction is over?

d) Network Study. The Manantali region has been one of the most isolated in all Mali, yet the process of dam construction will have brought in all kinds of outsiders (Malian and non-Malian) and opened new opportunities to people in the region. What kinds of long-term links will be made to the outside, either through the improved access of better roads, or through the individuals who have entered the region, as workers, government employees, or as private entrepreneurs? What kinds of new links can be made to existing service organizations that can continue in the area, even when the dam is finished? This latter question is especially important, since one goal of the project should be made to make

links with outside organizations which can be used during and after the resettlement project to lead to possible development actions

e) Women. Women often suffer most in the process of resettlement. Information on women should be integrated throughout; e.g., agricultural indicators should include both men's and women's fields; information on craft activities should include men's and women's activities; information on associations should include both men's and women's associations. However, to make sure that the question of the effect on women of the resettlement activity is clearly understood and delineated, it will be worthwhile to devote a separate study to women's roles in resettlement.

f) Cultural History and Archaeology: In the filling of the Selingue reservoir, the important and culturally valuable archaeological site called Niani was covered because no archaeological survey work was done. Since this was in Guinea, this caused an international dispute. Although international relations are not in play here, an archaeological survey ought to be done to avoid losing potentially valuable historical sites. This should include the collection of oral histories relative to these sites, an inventory and mapping of sites, and a sampling of those sites.

7.8.5 ORGANIZATION OF THE MONITORING UNIT

A. DATA COLLECTION

1. INDICATORS

The indicators will be chosen and developed by senior personnel of the Monitoring Unit, but the actual data collection should be done by village based interviewers. Indicators should be recorded on a set of forms designed in such a way as to facilitate collection and analysis of data. In general they should be done as simply as possible (while still remaining accurate), so that they are easy for both villagers and interviewers to understand.

There will need to be more than one set of forms however, since indicators will vary along the following parameters: 1) how often the information on the indicator will be collected; 2) what the unit of analysis is (e.g. individual, family, village); 3) whether only a sample or the whole universe is followed.

For example, certain indicators ought to be taken every month, e.g. well depth, market prices, labor prices. Others might be taken each quarter (e.g. information on time use, nutrition studies), while others ought to be done only once or twice a year (e.g. amount of land in fields, yield estimates). Yet others ought simply to be recorded as they occur, following no set timing (e.g. land or political disputes, which will not occur according to any specific calendar).

Variation will also occur in the unit of analysis for each of the indicators, and in the question of whether a sample ought to be taken of each, or an attempt made to cover all. For example, take the question of water use monitoring. For each village, all new wells ought to be counted and well depths for all new forages built by the project ought probably to be monitored. On the other hand, if the villagers begin to build many supplementary hand dug wells, only a percentage ought to be sampled. Also since much water use takes place at an individual household level, water use information should come only from a sample of individual households. Thus, for some indicators, the monitoring unit ought to follow the entire universe, while for most, some type of sampling ought to be done. Some indicators ought to be collected at the village unit, others at the household level, and yet others (for example markets or activities of associations) should be sampled at the unit at which the activity takes place.

2. IN-DEPTH STUDIES

Except for the archaeological study, which will use standard archaeological methods, the methodology for these studies should be based on anthropological methods of participant observation. First, the general problems to be covered ought to be discussed so that the goals of research are well understood. Once this is done, however, investigative techniques should emphasize informal interviewing in a number of in-village contexts, with the researcher remaining an extended period of time in the village. Once the situation is understood, researchers may want to develop some questionnaires to check specific points with a larger population, but the main lines of the inquiry should not depend on formal questionnaires.

Most of these studies ought to be spread throughout the whole period, although not necessarily continued without interruption, nor using the same personnel.

Despite the fact that the research will continue over a relatively long period of time, reports should not wait until the research is finished. Interim reports on the long-term studies should be presented in the quarterly reports discussed below.

While the monitoring can be done by interviewers with a relatively low level of education (e.g., DEF or equivalent or 9 years schooling, or functionally literate in Malinke), doing participant observation requires some methodological sophistication. This should be done by the more senior level researchers to be proposed below. Certain of these studies may be undertaken by the chef d'équipe and his adjoint; for others, other individuals may be called in for a short term.

B. DATA ANALYSIS

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Contextual data collected in the in-depth studies ought to be analyzed through standard anthropological methods for analysis of non-quantitative information.

Quantitative data collected (especially on the indicators) will need to be tabulated and presented in a useful format. While simple statistics could be generated using a hand-held calculator, the optimal method for tabulation and statistical analysis would be with a micro-computer. With access to simple statistical and word-processing programs, data could be entered regularly, a set of standardized tabulations and statistics generated, and a standardized report produced. It would take care and time to set this up in the beginning, but once the system was set up, it would enable the Monitoring Unit to present information in a timely fashion.

C. DATA PRESENTATION

There should be two kinds of outputs of the monitoring unit. The first of these should be interim (monitoring) reports on the progressive impacts of resettlement activities. The second of these is a final end of term evaluation.

1. INTERIM REPORTS

It is important that information move quickly and accurately back to management and decision-making units. Reports should be submitted quarterly. They should be based on factual information but the indicators should also be explicitly compared to the preceding report and significant changes noted. Problem areas should be stressed, and suggestions should be made for ways to mitigate problems which occur. These reports should include the following information.

- a) A presentation of the data on indicators gathered since the last report. This should be presented in the same format in the same order in every report, and should be in easily readable tabular form, so that it can be easily compared from report to report.
- b) A short analysis of the data presented in these tables. Special attention ought to be paid to the changes that have occurred since the preceding report, and the material ought to be evaluated in terms of the overall goal of the re-establishment of peasants' living conditions.

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c) A summary presentation of knowledge gained on the subjects of the in-depth field studies since the previous report was submitted, with some analysis of that information.

d) A section on the problems that have come up since the period of the last report.

e) Suggested solutions for these problems. These solutions should be grounded in the knowledge that the monitoring unit has about what are both feasible and desirable socio-cultural solutions in the resettlement area.

f) Discussion of relationships with other local organizations. At the beginning of the project, the focus should be on ways the resettlement project and other local organizations can cooperate in the actual resettlement project. As the actual move is completed, the focus should change to more emphasis on ways villagers can take advantage of economic development activities offered by those organizations.

Although these quarterly reports are important, the Monitoring Unit must be willing to communicate information through more informal, verbal channels. One way to ensure this is to include the head of the Monitoring Unit in meetings of Section Heads making decisions about project implementation. The Director of the Monitoring Unit should also hold regular meetings with the Director of the Resettlement Project to discuss important findings.

In addition to these regular reports, researchers doing in-depth studies should prepare final reports for the Monitoring Unit when their studies are finished. In addition to descriptive and analytical material, these studies should emphasize actual and potential problem areas and their solutions.

2. FINAL REPORT

At the end of the project, project staff should prepare a final report (evaluation) which discusses the impact of the whole dam construction and resettlement on the population of the Manantali region.

This final evaluation/report should have descriptive information and analysis about what happened, how and why it happened. It should be oriented around two basic goals:

a) For USAID, which sees this resettlement project in terms of a pilot way to resettle people in a least-cost manner, the report should summarize what has been learned from this project about whether this least-cost alternative was effective or not. For the ways in which it was not as effective as it could have been, suggestions should be made for the improvement of future projects of this type.

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b) For the people of Manantali, the final report should make some recommendations about the ways that people can work through local development agencies, in order to not only re-establish their level of life, but so as to improve it. Since the present project will not fund economic development projects directly, this final report should make some particular recommendations about how people can, in the words of the PID, take advantage of the economic opportunities, arising not only from OMVS activities in the region, but also from other activities. As noted in the interim reports, work on this should not wait for the final report, should other actions be feasible in the meantime, but these alternatives ought to be summarized and detailed in the final report.

The major organization presently active in the region is ODIPAC, which besides agricultural services, also has an active functional literacy program, separate from that of DNAFLA. Although ODIPAC's funding is not at present very great, it is the major rural development organization in the region, and has had programs of one sort or another for at least 10 years. Financial cuts have diminished the scale of the programs, but they have forced ODIPAC to select for continuation only those programs that have been successful, and to base peasant economic development on local participation, self-help and grass roots mobilization. This philosophy is consistent with that of the resettlement project itself, and ODIPAC already has personnel working in the villages which will resettle. Throughout the project, the resettlement should work with ODIPAC as appropriate, but the final report should concentrate on ways in which this can continue in the future. In the event that there is some provision for an "adaptability fund", which can provide small grants, this can work into ODIPAC's present plans for funding small village level projects (i.e. funding partly from village contributions, and partly from matching funds from some outside organization).

The Italian government is also considering a number of projects in the First Region, including irrigated perimeters on the Bafing. The progress of these projects ought to be followed, and suggestions made as to how the Manantali population could become involved in them, if appropriate.

Another subject that can be looked at is the use of Peace Corps volunteers. For example, the use of fisheries volunteers could be explored. This would not be expensive, but could be useful to help villagers make use of new opportunities.

Other alternatives will surely present themselves as the research commences, and the final evaluation should underline in detail some of these possibilities.

D. STAFFING

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Staff for the Monitoring Unit should be directly responsible to the Resettlement Project Unit. They may be hired directly or seconded from existing Malian agencies. The full-time staff of the Monitoring Unit will consist of a director, an assistant to the director, 6 interviewers, and support staff (chauffeur, secretary/data processor, gardien/planton). They will be aided in the in-depth studies by short-term field researchers. The Unit will be aided by one technical assistant, who will make several short-term visits through the duration of the project.

1. DIRECTOR

The responsibilities of the director will include: participation in management of the overall project through interpretation of monitoring results, liaison with economic development organizations in the region, administration and supervision of the Monitoring Unit (design of survey forms and in-depth studies in collaboration with other researchers, supervision of other researchers and interviewers), compilation and presentation of quarterly and final reports. If possible, the director should also pursue research on the in-depth studies.

The director should have an M.A. (or its equivalent) in social anthropology, rural sociology, or applied anthropology. The individual should be recruited within Mali, or among Malian students studying abroad.

2. ASSISTANT TO THE DIRECTOR

The assistant should aid the director in all the above tasks. This person would probably be particularly important in regular supervision of field interviewers. The presence of an assistant is most important during the first year when the Monitoring Unit has many organizational tasks, as well as in the final year when the final reports are being prepared.

The assistant should have at least a B.A. (or equivalent) in the social sciences.

The director and assistant will be stationed in Manantali.

3. INTERVIEWERS (Full Time, Approximately 6)

The interviewers are responsible for data collection in the villages. They will collect data on the indicators, and will also assist researchers as necessary for the in-depth studies.

Two alternatives exist concerning interviewer qualifications. If literacy in French is necessary, they should have approximately 9 years of education (DEF). The alternative of using persons literate in Malinke ("paysans alphabétisés") should also be considered. If ODIPAC has a cadre of literate peasants on the

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villages, it may be preferable to hire a number of these people, on either a full time or part time basis, to record some of the village level indicators.

In any case, interviewers should be recruited and trained locally and should be stationed in the villages. Since they will have to cover more than one village, they should be provided with transport.

4. FIELD RESEARCHERS FOR IN-DEPTH STUDIES

Their duties will be to design and to do the in-depth studies. They will include a mix of short and long-term contract personnel, to be decided on by the Monitoring Unit when it finalizes precise study plans.

In general these should be experienced social scientists from Malian research institutions, although the unit should consider getting final year students from ENSUP in Bamako or from the IPR in Katibougou who would be interested in doing "Memoires de Fin d'Etudes" in conjunction with the project. Given the sexual division of labor in rural Mali, a woman should be recruited for the study on women.

Researchers should be assisted by the project's full-time interviewers, although in special cases (e.g. the archaeological study) it may be necessary to recruit other short-term personnel.

5. TECHNICAL ASSISTANCE

Throughout the period of the project, a short-term technical assistant would be provided to aid the director. Tasks will include: assistance in research design, in the establishment of the role of monitoring unit in project decision making, in the establishment of reporting procedures.

The technical assistant should have a Ph.D. in social anthropology, applied anthropology or rural sociology, significant field experience in rural West Africa, significant experience in applied research design and dissemination of results, and should be fluent in French.

This person could be provided by the Institute for Development Anthropology through IDA/Clark University Areas Development Cooperative Agreement.

7.8.6 BUDGET*

Assumptions begin 2nd six months FY84 and terminate FY87.

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	FY84	FY85	FY86	FY87
PERSONNEL		(6mos?)		
Director		6mos	12mos	12mos 12mos
Asst. Director		6mos	12mos	(12mos?) 12mos
Interviewers (6)		36p.mos	72p.mos	72p.mos 72p.mos
Archaeology:				
Researchers & Technicians (6 @ 3mos)		18p.mos		
Laborers (10 @ 3 mos)		30p. mos		

Other
 Researchers
 Other Assistants

Technical Assistance

Contract Researchers

Support Staff

Chauffeur
 Secretary/data processor
 Gardien-Planton

Housing Costs for these (including utilities? furnishings?)

MAJOR EQUIPMENT

1 4-wheel drive vehicle	na	na	na	na
8 mobylettes (6 inter-viewers, 2 office use)	na	na	na	na
1 microcomputer with necessary software and electrical equipment (to be shared with Management Unit)	\$15,000	na	na	na

OTHER

Fuel

Other Operating
Expenses for
Field

Office Supplies

Paper
Pens
Stencils

Misc. Field Supplies

Expenses (2 camp
beds, etc.)

Data Processing Costs

Library (ethnographic
material, research design
materials)

Archaeological Study
(see original terms
of reference)

Training in Computer
Use

* Editor's note: The budget developed by the analyst has been included in the detailed project budget in the appropriate line items

7.9. Initial Environmental Examination: Revision

Project Country:	Mali
Project Title	Manantali Resettlement (688-0233)
Funding	\$21,190,000 (Grant)
Life of Project	4 years (Initial Obligation FY 84): PACD June 30, 1988
IEE Prepared by	Dr. Gerald Cashion USAID/Mali Design/Evaluation Officer
Date	May 4, 1984
Environmental Action Recommended	Negative Determination
Justification:	No significant environmental effects will result from the USAID resettlement project

INTRODUCTION

USAID in 1976 granted the OMVS \$2.5 million to finance an environmental assessment of the potential impact of development activities planned for the Senegal River Basin. These activities included the construction of two dams, Diama and Manantali, to facilitate the flood and flow of the river and thus the vast expansion of irrigated agriculture and the potential generation of up to one billion kilowatt hours of electrical power annually. The American firm of Gannett, Fleming, Corrdry, and Capreuter, Inc. carried out the assessment in 1977-79 and described the supposed environmental impact that would be caused by the dam construction. For discussion of the environmental issues in depth, the reader is referred to the Gannett, Fleming report.

It should be stressed that the construction of the Manantali Dam will have a major impact on the environment of the area. Construction is on schedule and the impact of this and the completion of the dam is beyond the control of USAID. The government of Mali and the OMVS have requested USAID's assistance in mitigating the negative environmental effects of the construction to the people most directly affected. Hence, the project's objective is to execute the mandatory resettlement of the threatened population within acceptable bounds of physical and human environmental change.

To help achieve this, several studies have been done. These were intended to examine the potential of provisional resettlement sites chosen by the project beneficiaries as well as to identify possible environmental problems. Important among design concerns were the availability of sufficient water, land, and forestry resources to accommodate an influx of people into the chosen areas.

Thus, a hydrogeological study was done and 26 test wells drilled at the provisional sites. Of these tests, 23 provided water and 20 were judged completely positive. All sites were judged viable. Further, two soils surveys were undertaken, these in addition to a larger scale (1:200,000) under the USAID-financed Land Resources Inventory Project. These have provided evidence that soils in the resettlement zones are similar to those presently being farmed, although garden plots and the fertility on house fields now cultivated will be lost.

An in depth socioeconomic study censused both people and animals to determine the land area required for crop cultivation and livestock grazing, the mechanisms by which the beneficiaries might best participate in the project, production systems employed, and potential food assistance needs. The study has shown the land and forestry resources to far exceed project requirements. For

example, the area available for livestock grazing is 25 times larger in size than what is needed for settler animals based on a UBT (area per animal) calculation.

A topographical survey has been done to determine the viability of the sites for village reconstruction and particularly the drainage features and thus requirements for the locations of villages and households on the sites.

In addition to the special studies which were funded by the UNDP, project analyses examined other factors that would affect the resettlement. The land clearing method chosen by the project design team resulted from the collaborative efforts of the engineers, the agronomists, and the anthropologist. This activity will seek to minimize soil disturbance and maximize the participation of the beneficiaries while removing a minimum numbers of trees necessary to reestablish cropping systems.

DISCUSSION OF IMPACTS

A. Land Use and Natural Resources

1. Changing the Character of the Land Through:

a) Increasing the Population of People or Animals in an Area

The project itself will have no impact on the absolute population of the zone. Migration into the zone or higher fertility rates will not be caused by the resettlement activities. However, local population densities may increase due to the fact that a large land area will be rendered uninhabitable by the construction of the dam and the reservoir that will be created. That is, the same population, plus any influx that permanently settles will be obliged to live on less land. Thus, from a relatively unpopulated state of less than 2 people, the resettlement zones will go to a population density of about 5 inhabitants per square kilometer.

The environmental impact will be moderate. The agro socioeconomic study has estimated the resettlement zones to cover an area of 97,200 hectares of which some 1095 will be needed for village structures and 5900 for cultivation of crops, leaving 90,200 for fallow fields and pasturage which is about 25 times more than the minimum area estimated as necessary for the resettlement effort.

The land in the resettlement zones now serves as cropland or pasturage or both. Although the area of crop cultivation will increase, the nature of the use of the land will not change. Project activities are intended to facilitate the reestablishment of production systems as they currently exist.

Funds are provided in the project to construct one latrine in each family household, which will be a substantial improvement over what is now found in the villages. Moreover, topographical surveys of each new village site are now being carried out by the Malian government's National Office of Cartography and Topography with UnDP funds. These surveys will provide information to enable the new villages to be laid out and sited to facilitate proper drainage. Households will be located at the higher elevations on the sites and as many trees as possible will be retained.

Infrastructure to provide social services will be constructed in the principal village. This will include a maternity clinic, a dispensary, a pharmacy, a nine classroom school, a forestry post, a veterinary post, warehousing facilities for agricultural produces, government administrative offices' for the Ministry of the Interior, four dwellings for senior government officials, and transit quarters for official visitors. These facilities will upgrade what presently exists and should furnish more extensive and better services to villagers than those now available.

b) Extracting Natural Resources such as Minerals
or Water

Non-renewable mineral resources will not be extracted by the project. However, a minimum of 72 water points will be constructed in such a way as to minimize potential problems. For example, cisterns, if built, will have linings that rise at least one meter above the ground to prevent small children and animals from falling in and to prevent contaminated surface water from running into the well.

Bore or tube wells are commonly used for domestic and agricultural water supplies. These are environmentally sound sources of water if soils are favorable and appropriate boring equipment is used. Such wells should be capped to prevent contamination. Driven wells, which are made by driving a well-point or pointed strainer into soft or sandy soils are also an option. The driven wells require a special pump, and this may produce maintenance problems.

If only tube or bore wells are financed by the project, provision should be made to ensure effective maintenance of the newly constructed wells. Community support and acceptance of responsibility for the wells are crucial to both the maintenance and development of the wells. Water development projects in which villagers were elected as caretakers and have been trained in operation and/or preventive maintenance, have been successful. It is recommended that the project implementation team make all possible linkages with three World Bank-financed projects which include an activity to drill three hundred tube wells, equip the wells with manual pumps, and train villagers to repair and maintain the pumps.

Since the World Bank projects include the area of the resettlement project in their geographical coverage, its personnel should be able to train settlers in pump maintenance. Care must be taken, however, to assure that the manual pumps furnished by the two projects are identical, preferably, but at least similar.

It is possible, given the immensity of the reservoir not far from the zones of resettlement, that the water table may rise in spite of the extraction from the project wells. This has proved to be the case in the resettlement areas adjacent to the recently-completed Selingue dam in southern Mali. Because of the rise in water table, villagers have been able to hand dig shallow wells and reach water at depths of less than ten meters.

The USAID Groundwater Monitoring project (625-0955) will develop a subterranean water monitoring capability throughout the Senegal River Valley, including the Bafing and the Manantali area. This activity, already authorized and being executed by another division in the same agency responsible for the population resettlement, will signal and abnormal lowering of the water table in the project area.

c) Land Clearing

The project will selectively clear about 5500 hectares of land at or adjacent to the resettlement sites. An estimated 500 of these hectares will be the actual sites on which villages will be located, and 5000 additional hectares will be cleared so that new fields can be sown.

The land clearing activity is an important step in assisting farm families reestablish their agricultural production systems at the new sites. The ideal method would be to let farmers clear their own fields. However, the time constraint requires the government to help farmers with this effort.

Almost all the new sites are located in upland, wooded savannas with some riverine forest fringes. The project area is essentially one of secondary timber growth. Most of the land to which settlers will move has been farmed in the past and now lies in fallow. Soils are predominantly alfisols and utisols whose agricultural capabilities are largely dependent on topography and the presence of lateritic material. Topsoil in much of the area is shallow (50 cm or less), overlying plinthite.

In view of these conditions, several alternative methods of land clearing were considered -- including the use of chainsaw teams, farm labor, and mechanized clearing of several different methods (described in land clearing analysis, Annex 7.2.3).

Given the time and labor requirements of traditional handclearing, the logistical setup needed to support a chainsaw operation, and the potential environmental damage certain methods of mechanized clearing might cause, the project design team chose a method which will enable farmers to participate, yet clear large trees with little damage to the fragile topsoil.

The Village/project Liaison Committees will, through their members, identify all trees to be removed from village sites. Individual farmers will clearly identify all large trees to be removed from their fields. Bulldozers with shear blades attached will cut the trunks of these trees just above ground level, thus leaving root systems and topsoils undisturbed.

None of the underlying acidic soils will be brought to the surface. All productive trees will be retained. Finally, since surveys conducted under the auspices of the OMVS have indicated that only about 12% of trees in the project area are greater in diameter than 22cm (8 1/2 inch), relatively few trees will have to be cut. Farmers will therefore be assisted by the project to clear the heavy timber but will themselves be responsible for clearing saplings, shrub, and brush.

d) Changing the Character of the Soil

A significant impact on the soil is not expected to result in the areas to which villages will move. Although some land clearing is planned in the project, as described above, a clearing method was chosen specifically to minimize any disturbance to the thin layer of topsoil and avoid bringing lowerlying acidic soils to the surface.

Areas to which villages will move exhibit a secondary timber growth. Much of the land lies in fallow but some is currently being cultivated. Satellite farming hamlets now occupy some of the sites. These hamlets have social ties to the larger villages which will relocate at these sites. Indeed, many of the villages which must resettle have chosen sites at one time formerly occupied by families of the village.

Cattle and small ruminants now extensively graze the resettlement area. The socioeconomic study has shown that the amount of hectareage required for the domestic animal population is but a small amount of the total area available.

The farm production system utilizes the slash and burn, or swidden method on fields cultivated at some distance from the village proper. These are generally farm for only a few years and then abandoned. Fields more proximate to the village are farmed every year. These fields are manured and the fertility of the soils

tend to be enhanced. Since animal-drawn plows are relatively few and the population density of the resettlement areas will remain low, pressure on the land should be minimal and the condition of the soil little changed from the current situation as a result of crop cultivation or grazing.

Some erosion is likely to occur at village sites. The project will seek to minimize this by locating villages and household concessions on sites to restrict erosion. To facilitate this, topographical surveys have been executed for each new site and village plans will be drawn utilizing the survey results.

Lastly, it should be noted that to mitigate both the economic and environmental impact of the resettlement, the project will finance the creation of a tree nursery so that both grafted and non-grafted fruit, fuel, and shade samplings will be available to farmers soon after the population transfer has been completed.

e) Construction

The project will finance construction other than wells, already discussed above. These construction activities will affect the environment.

(1) Rural tracks: Approximately 200 kilometers of rural tracks will be improved or constructed under the project. Little impact will be caused by the improvement of about 100 kilometers. However, excavating and grading activities will be extensive during the process of construction or improvement of all the kilometers. No currently productive land or village population is expected to be impinged upon by the construction. Barrow pits will be created which will accumulate standing water during the rainy season. These will be very shallow following the standard practice and will pose less of a threat to health from disease vector breeding than do the many low lying areas which flood during the rains. Water for construction will be pumped from the nearby river and there will be no drawdown of local aquifers.

From a socio-economic prospective, environmental changes can be expected to a greater and of a more long-lasting nature than the relatively short-term impacts of the construction process itself. Physical mobility will increase considerably. Land values, particularly for land near the road alignment, will most likely increase raising questions of tenure and ownership. The demand for health and educational services is expected to rise as access to those services improves. Marketing and transportation patterns will be altered significantly.

As a whole, these changes are expected to produce beneficial consequences for the population of the region. Improved access to markets and improved transportation services should lead to improved incomes as freight costs are reduced, losses due to spoilage minimized and the general ability to move production to sales points is upgraded. Access to the benefits of dispensaries, clinics and hospitals as well as educational facilities should lead to improvements in the quality of life of the settler population. Demand for such services, however, can be expected to increase the economic burden on institutions charged with their supply.

(2) Buildings: Offices and housing for the project staff will be constructed in an area reserved for OMVS project personnel. Thus, a site adjacent to the facilities which serve the construction consortium, the control engineers, and the OMVS staff has been reserved for the resettlement personnel.

A nine-room school, a dispensary, a maternity clinic, a pharmacy, a forestry post, a veterinary post, administrative offices, four modest dwellings, and a 200m² warehouse will be constructed in the principal resettlement village. In addition seven smaller warehouses will be built at other sites.

Village dwellings will be rebuilt on the sites chosen by the settlers. These will replace those lost when the reservoir fills.

This construction will affect only a limited area in the resettlement zones and is expected to have a moderate, beneficial impact.

2. Altering Some of the Significant Natural Defenses Provided by an Area

The project will finance some land clearing and a resettled farm population will increase the amount of land under cultivation. It is conceded that removal of vegetation will affect runoff rates, stream flows, erosion patterns, sedimentation rates and wildlife composition. Short term effects of the project will alter some of the natural defenses, but these will be mitigated by selective tree clearing using a method chosen for its appropriateness, by the future planting of saplings provided by the tree nursery, and by using the topographical survey data to site new villages to minimize erosion.

3. Foreclosing Important and Perhaps Better Uses of the Land

The land in the project area will be used for the same activities it has been in the past -- crop cultivation, livestock grazing, and the harvesting of forest products. A land use survey of the area has been completed at a 1/200,000 scale. A soil study

covering the resettlement sites on a scale of 1/50,000 has been done. A more detailed soil study of the sites is now being completed at a 1/20,000 scale. The use of the land proposed by the project is based on the necessity of the displacement of the population, current use patterns and production systems, population and livestock density, the land carrying capacity, cropping and grazing requirements, and the desires of the beneficiaries. No specific future use of the land will be foreclosed.

4. Irreversible or Inefficient Commitments of Natural Resources

No irreversible or inefficient commitments of natural resources will be used for the same purpose as they are now but more intensively. The amount of land area required to support the number of people and animals which will occupy the zone has been estimated. The area available exceeds by many times (discussed under A1(a) the hectarage required.

5. Jeopardizing Man or His Works Because Either is put in a Zone of Potential Disaster

The Manantali dam will create a large reservoir of water. A majority of the people which will be displaced by the reservoir has chosen to resettle on both banks of the river immediately downstream of the dam. Their site selections are based in part on advantages they perceive will accrue from access and egress provided by the new all-weather road from Mahina to Manatali; and from future irrigation and other development in the area.

These settlers will resettle at locations that would be inundated if the dam were to burst, a potential disaster that project designers have considered in drawing up the village sites plan.

The conclusion has been reached that the possibilities of this occurring is too remote to preclude the relocation of people at the sites of their choice.

No other disaster potential, excluding drought, has been identified.

B. Water Quality

1. Changing the physical state of water.

Only a minimal increase in siltation that could change the physical state of water is expected as a result of land erosion. Runoff from cleared land could be the cause of such a change. Physical changes in water usually change the chemical and biological state of water by sediments lessening the amount of

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light that penetrates a water body and through slowed or stopped photosynthesis. Water runoff and erosion will be mitigated by utilizing a land clearing method which does not disturb the root systems of trees and by using the topographical survey to site villages.

2. Changing the Chemical or Biological States of Water

Deleterious changes in the chemical or biological states of water are not expected to result from this project.

If the borehole-cistern combination is chosen as the water provision of villagers, the cistern opening will be built one meter above the ground to prevent runoff into the cistern. Further, animal watering troughs will be built at a few meters away from the cistern to prevent potential contamination. A concrete apron will also be built around the cistern.

If boreholes are chosen, they will be equipped with manual pumps, thus eliminating the possibility for contamination.

No chemical fertilizers, herbicides, or pesticides will be used in the project.

3. Changing the ecological balance of a water body, thereby changing its chemical and biological balance.

No alien organisms or toxic materials are foreseen to be introduced in local water bodies by this project. No chemical fertilizer, herbicides, or pesticides will be financed in the project.

C. Atmospheric

1. Air Additives

No additives are expected to enter the air as a result of this project.

2. Air Pollution

The only source of air pollutants generated by the project will be from the exhausts of the few vehicles necessary to monitor and implement project activities. These are expected to be insignificant.

Smoke from the slash and burn method of agriculture practiced is an annual factor governing air quality. Since the project will assist farmers to clear new fields, which will entail the burning of some brush, it is foreseen that an increased amount of smoke will enter the air but the added pollutant effect is expected to be insignificant.

3. Noise Pollution

The only noticeable noise resulting from the project will come from the construction activities and vehicles. The former will be minor and short lived, and the latter minimal and dispersed.

D. Cultural

The project is not expected to destroy important physical symbols of the culture in the project area, nor will it dilute the cultural patterns among the beneficiaries.

It should be noted that the dam construction and the filling of the reservoir will result in a loss of traditional village sites, including shrines and cemeteries. The resettlement has attempted to mitigate the effects of these losses by having the displaced population choose sites to which villages will move and by facilitating the performance of rites seeking to assure a successful installation at the new sites.

It has been recognized that the influx of construction workers will bring alternate lifestyles and practices that may threaten the strength of the extended family. These might include prostitution, drugs, and alcohol. Such potential problems have already been aired in village meetings by the Resettlement Project staff. Project personnel can blunt some of the potential negative aspects of the dam construction by educating people about them.

E. Socioeconomic

1. Changes in Economic Growth and Employment

The project is not intended to effect changes in economic growth and employment. Its purpose is simply to resettle the population in such a way as to minimize negative aspects of the forced relocation and sustain current standards of living.

The zones chosen for resettlement by the population will over the long term see economic change brought about by better access to markets and services and by post resettlement/dam construction development activities. In the meantime, the influx of construction workers and the creation of short term employment opportunities have a demand for goods and services have caused change in the project zone.

2. Movement, Resettlement, or Changes in Population

The project will not cause such changes. It is intended to minimize the negative effects of the dam construction. Care has been taken to encourage the settlers to relocate in a manner which will facilitate potential post-resettlement development. Thus, follow-on projects may effect population movement in the area.

3. Changes in Cultural Patterns that Could Affect Socio-Economic Patterns in a Major Way

No such changes are foreseen to result from the resettlement project.

F. Health

The dam construction -- once again -- and the forced resettlement will have major impacts on the displaced population, and on the host population to a minor extent. The resettlement project seeks to minimize the negative aspects of the impact.

1. Nutrition will be seriously affected by the resettlement. The loss of truck gardens and productive fruit trees will reduce nutritional status and cash income. To diminish this problem, the government of Mali has asked the World Food Program to provide foodstuffs to the settlers for a period of two years subsequent to the move. USAID will finance storage facilities for these commodities and the operating expenses of distribution by the Resettlement Project personnel from the storage locations.

To gauge and be able to note serious changes in the nutritional status of the population, a nutritional survey will be conducted by a capable Malian government agency -- either the National Institute of Public Health Research or the Medical School

2. Pesticides Toxicity

No herbicide, pesticides, or chemical fertilizer will be financed by this project.

3. Water Related Disease Sectors

The project itself will have no foreseeable impact on water related disease sectors. The dam construction will impact on water related disease sectors. An increase in the incidence of schistosomiasis will occur, particularly with the influx of Bozo fishermen who will move in to exploit the fish resources the reservoir will provide.

Resettlement planning has attempted to locate village at downstream sites more than two kilometers away from the river, which is the limit the black fly which transmits onchocerciasis can travel. In addition, the project will finance an epidemiological survey aimed specifically at identifying cases of schistosomiasis and of trypanosomiasis and treating them. - anosomiasis and treating them.

4. Zoonotic Disease Incidence

No increase in the incidence zoonotic diseases is foreseen to result from this project. Note that a veterinary post to be established at the principal resettlement village could effect a reduction in disease incidence through the better and more extensive provision of services.

5. Eliminating an Element in Ecosystem

The project will not directly or indirectly cause the elimination of any element in the area of ecosystem.

Identification and Evaluation of Environmental Impacts
in Impact Areas

A. LAND USE AND NATURAL RESOURCES

1. Changing the character of the land through:

- a. Increasing the population of people or animals M
- b. Extracting natural resources such as water M
- c. Land clearing M
- d. Chnging soil character L-
- e. Construction M+

- 2. Altering natural defenses L-
- 3. Foreclosing imporant uses N
- 4. Irreversible, inefficient commitments L-
- 5. Jeopardizing humans or their work L-

B. WATER QUALITY

- 1. Physical state of water N
- 2. Chemical and biological states N
- 3. Ecological balance of a water body N

C. ATMOSPHERIC

- 1. Air additives N
- 2. Air pollution N
- 3. Noise pollution N

D. CULTURAL

- 1. Altering physical symbols N

E. SOCIOECONOMIC

- 1. Changes in economic/employment patterns L+
- 2. Changes in population N
- 3. Changes in cultural patterns N

F. HEALTH

- 1. Human nutrition H
- 2. Pesticide toxicity N

LEGEND

- N - No environmental impact
- L - Little environmental impact
- M - Moderate environmental impact
- H - High environmental impact
- U - Unknown environmental impact
- + - Positive impact
- - Negative impact

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8.1 DRAFT PROJECT AUTHORIZATION

Name of Country/Entity : Mali
Name of Project : Manantali Resettlement
Number of Project : 688-0233

1. Pursuant to Section 121 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Manantali Resettlement Project for the Government of the Republic of Mali, involving planned obligations of not to exceed \$17,163,000 (Seventeen million one hundred sixty three thousand United States Dollars) in grant funds over a four year period from date of authorization, subject to the availability of funds in accordance with the AID OYB allotment process, to help in financing foreign exchange and local currency costs from the project. The planned life of the project is four years from the date of initial obligation.

2. The project consists of the provision of construction, technical assistance, commodities, and operating support to assist the Government of the Republic of Mali in resettling the 11,000 villagers who must move from the reservoir area of the Manantali Dam, presently under construction. The project will systematically plan and implement sequential activities designed to resettle villagers so as to minimize the negative effects of the involuntary move.

Activities that will begin with project authorization will complete detailed planning efforts for resettlement already begun under project design and in conjunction with technical studies of the resettlement zone. Through the Malian government organization charged with Manantali resettlement, technical study results will be utilized to specify sites for seven new village clusters in the five zones chosen by villagers. Coordination with other donors and regional organizations shall be assured to complement AID-financed activities and to minimize project expenses. A comprehensive master list of resettling villages shall be completed including precise numbers of villagers, numbers and types of buildings, size and ownership of fields, numbers and kinds of productive trees and animals, etc. Offices and lodgings for project staff will be built. New villages shall be reconstructed, access to the sites assured, wells sunk, and fields cleared. Government administrative and service infrastructure will be rebuilt. Food stuffs donated by the World Food Program will be distributed. An archeological and epidemiological/nutritional survey will be conducted. Finally, people and their belongings will be transported to the new sites.

3. The Project Agreements which may be negotiated and executed by the officers to whom such authority is delegated in accordance with AID Regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

4. Source and Origin of Commodities, Nationality of Services

Commodities financed by AID under this project shall have their source and origin in Mali or in the United States except as AID may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Mali or the United States as their place of nationality, except as AID may otherwise agree in writing. In addition, commodities financed under this project may have their source and origin in countries included in AID Geographic Code 941 as their place of nationality except as AID may otherwise agree in writing.

Ocean shipping financed by AID under this project shall, except as AID may otherwise agree in writing, be financed only on flag vessels of the United States.

5. Conditions Precedent and Covenants

A. Conditions Precedent

Besides standard provisions, before any disbursements of funds or the issuance of any commitment documents under this project, the government of Mali must furnish, in form and substance satisfactory to USAID, evidence that:

- (1) a Resettlement Project Unit (RPU) to manage the population transfer has been officially established and its responsibilities and authorities defined.
- (2) a Manantali Resettlement Project Director familiar with the planning of the resettlement activities has been officially appointed.
- (3) other personnel as listed in the project agreement have been officially assigned to the Resettlement Project Unit.

B. Covenants

In addition, the government of Mali will covenant the following:

- (1) a financial management and accounting system, including inventory control, which satisfies USAID regulations will be established in the Resettlement Project Unit.
- (2) Private sector firms will execute all project construction and other activities unless otherwise jointly agreed by the GRM and USAID.
- (3) Appropriate ministries will fully staff the village infrastructural facilities to be built.

6. Waivers

The following waivers to AID regulations are hereby approved:

A source /origin waiver of the requirements of Section 636 (1) of the Foreign Assistance of 1961, as amended, to permit the procurement of ten

motor vehicles and twenty motorbikes (mobylettes) from Code 935 countries of an approximative value of \$200,000.

In connection with the waiver granted above, I certify that special circumstances exist which justify waiving the requirement set forth in Section 636 (i) of the Foreign Assistance Act of 1961 that all motor vehicle purchased with AID funds be manufactured in the United States.

Signature _____

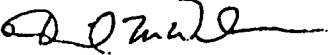
M. Peter McPherson
Administrator, AID

Date: _____

8.2 WAIVER JUSTIFICATION

VEHICLE PROCUREMENT WAIVER FOR MALI MANANTALI POPULATION RESETTLEMENT (688-0233)

ACTION MEMORANDUM TO THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: David M. Wilson, Director USAID/Bamako 

SUBJ: Request for source/origin procurement waiver from geographic code 000 (U.S. only) to code 935 (selected Free World) and a waiver of Section 636 (i) of the Foreign Assistance Act of 1961.

PROBLEM

Your approval is requested for the authorization to waive the source/origin requirements of the Federal Procurement Regulations as well as section 636 (i) of the Foreign Assistance Act of 1961 to enable USAID/Bamako to procure 30 non-American-made vehicles for the effective implementation of this project.

FACTS

Cooperating Country : Mali
Nature of Funding : Grant
Name of Project : Manantali Resettlement
Number of Project : 688-0233
Description of Goods : 8 Toyota 4 wheel-drive station wagons
20 50cc motorbikes
1 Mercedes 10 ton truck
1 Peugeot 404 pick-up
Probable source : Mali
Probable origin : Japan/Europe

DISCUSSION/JUSTIFICATION

1. Section 636 (i) of the FAA prohibits procurements of vehicle of non-US manufacture. However, the provisions of section 636 (i) may be waived when special circumstances are found to exist. Under Chapter 4C2d (1) b of Handbook 1, Supplement B, special circumstances are deemed to exist if there is a lack of adequate service facilities and supply of spare parts for U.S. manufactured passenger vehicles.

2. This population resettlement project will be implemented in a remote area of Mali's First Region where the only effective vehicle repair/maintenance facility is that of the construction consortium building the dam.

3. A majority of light vehicles used by the dam construction contractor, the control engineer firm, and the OMVS unit at Manantali are Toyota all-terrain C-60 diesel, 4-door models. Almost all heavy trucks are Mercedes. The CAMICO brand light (50cc) motorbike manufactured in Mali is by far the prevalent type at the construction site and the model most common throughout the country.

4. The construction consortium has tentatively agreed to furnish fuel and maintenance service to the Resettlement Project Unit on a cost reimbursable basis. Representatives of the Consortium suggest that maintenance could best be provided for vehicles of the same type and brand now at the job site.

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5. Procurement of project vehicles of the same manufacture as those used by all the organizations now based at Manantali will facilitate project motor, pool operations, minimize parts costs and procurement needs, and avoid the problem of stockpiling a large inventory of parts. The Bamako-based liaison vehicle is intended for passenger transport and light delivery service. It should be a gasoline model Peugeot 404, the most common vehicle with the best spare parts availability of any in Mali.

RECOMMENDATION

1. That you conclude that special circumstances exist as discussed above.
2. That you certify that the exclusion of Free World countries other than the cooperating country and those of Code 935 would seriously impede the attainment of U.S. foreign policy objectives and those of the foreign assistance program.
3. That you waive the regular procurement requirements.
4. That you thus permit the purchase of the non-U.S. manufactured vehicles listed above.

Approved _____

Disapproved _____

Date _____

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Department of State

OUTGOING TELEGRAM

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ORIGIN AID-35

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PDPR-01 PPPB-03 GC-01 GCAF-01 GCFL-01 FM-02 WIO-01
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AFR/DP:ICOKER AFR/DR/ENGR:DSMITH
AFR/DR:MCOHEN AFR/DR/SVAP:JMCCA E
AFR/SVA:HGRAY (DRAFT)
GC:LDESOTO AFR/DP:SSHARP PPC/PDPR/RD:JATHERTON
P C/PDPR/RD:JLIJEVSKY AFR/DR/ENGR:JNEAVES
AFR/DR/ARD:JHARTMAN AFR/DR/SVAP:RSIMMONS
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E.O. 12065: N/A
TAGS:
SUBJECT: PID REVIEW: MANANTALI RESETTLEMENT, PROJECT 625-0935

REF: (A) STATE 119605; (B) BAHAKO 2784; (C) STATE 140931

1. ECPR MET JUNE 23 TO REVIEW SUBJECT PID, ATTENDED BY DAA/AFR LOVE AND REPRESENTATIVES OF SWA, DR, DP, PPC, USAID/BAHAKO, CHA LED BY DAA/AFR (WEST AND CENTRAL) FRANK CORREL. PID IS APPROVED FOR AMOUNT NTE DOLS. 10 MILLION. ECPR PROVIDES FOLLOWING GUIDANCE FOR PP PREPARATION IN ADDITION TO INSTRUCTIONS PROVIDED BY TECHNICAL REVIEW COMMITTEE (PARAS. 2-9 BELOW):

----- A. PID STATES THAT NECESSARY INITIAL STUDIES IN SOILS, HYDROLOGY, AGRONOMY, SOCIOLOGY, PUBLIC HEALTH AND TRANSPORT WILL BE FUNDED BY UNDP PRIOR TO FUNDS BEING MADE AVAILABLE BY AID. THESE STUDIES AND THE MANAGEMENT STUDY PROPOSED FOR AID PH&R FUNDING SHOULD BE SUFFICIENTLY ADVANCED PRIOR TO FIELDING PP DESIGN TEAM TO PROVIDE THE INFORMATION REQUIRED BY DESIGN TEAM TO DETERMINE AN ACCURATE COST AND RELIABLE DESIGN FOR THE PROJECT.

----- B. THE UPPER LIMIT OF AID'S CONTRIBUTION IS DOLS. 10 MILLION, WITH NO ONWARD COMMITMENT PAST RELOCATION PERIOD PROPOSED IN PID. IF DURING PP DESIGN ADDITIONAL COSTS ARE IDENTIFIED, MISSION SHOULD IMMEDIATELY NOTIFY OMVS AND GRM TO BEGIN SEEKING OTHER SOURCES OF FUNDS TO COVER THESE COSTS. PP SHOULD INDICATE MANNER IN WHICH ANY ADDITIONAL COSTS WILL BE FUNDED FROM NON-US SOURCES.

----- C. PROJECT PAPER IS TO BE SUBMITTED TO AID/W FOR APPROVAL.

3. TECHNICAL COMMITTEE REVIEWED SUBJECT PID MAY 5. USAID/BAHAKO WAS REPRESENTED BY DESIGN OFFICER LUCKE. COMMITTEE GENERALLY BELIEVED PID WAS WELL DONE AND THAT MOST CO;PONENTS REQUIRED FOR RESETTLEMENT PROJECT WERE IDENTIFIED. INSTRUCTION TO THE PP DESIGN TEAM FOLLOW BELOW.

3. COMMITTEE RECOGNIZED THAT PROJECT REPRESENTS A NECESSARY CONTRIBUTION TO OMVS INFRASTRUCTURE PROGRAM TO WHICH OTHER DONORS HAVE PLEDGED DOLS. 750 MILLION. THIS INFRASTRUCTURE PROGRAM WILL PROVIDE SUBSTANTIAL IRRIGATION, HYDROELECTRIC POWER AND NAVIGATION BENEFITS TO THE THREE MEMBER STATES, AND AID PARTICIPATION IS CONSISTENT WITH AID'S SDP GOALS.

4. DISCUSSION FOCUSED PRINCIPALLY ON THE COST EFFECTIVENESS OF THE APPROACH PROPOSED IN PID, I.E., THE RATIONALE FOR INCLUDING ECONOMIC DEVELOPMENT OBJECTIVES AS STATED IN PROJECT PURPOSE RATHER THAN LIMITING PROJECT TO RE-ESTABLISHMENT OF PREVIOUS LEVEL OF ECONOMIC ACTIVITY. EXPERIENCE WITH LANDS SETTLEMENT SCHEMES HAS LED TO THE CONCLUSION THAT THE CLOSER THE SCHEME IS TO BEING SPONTANEOUS THE MORE LIKELY IT IS TO BE SUCCESSFUL. ALSO, THE ECONOMIC CHANGE IN THE AREA BROUGHT ABOUT BY THE DAM CONSTRUCTION WILL PROVIDE OPPORTUNITIES FOR THE DISPLACED POPULATION WHICH WILL COMPETE WITH THEIR TRADITIONAL OCCUPATIONS, TO AN UNKNOWN DEGREE AT THIS POINT. THERE ARE CERTAIN ANTICIPATED DIFFICULTIES, SUCH AS IN ESTABLISHING THE NECESSARY PREREQUISITES FOR ECONOMIC DEVELOPMENT ACTIVITIES (I.E., GOVERNMENT SERVICES, GRM POLICY CHANGES FACILITATING PRODUCTION, ETC.), THE PERCEIVED ADVANTAGES TO THE SETTLERS OF ECONOMIC ACTIVITIES CONNECTED WITH THE DAM (PID, P. 12), AND ADVICE FROM RESETTLEMENT SPECIALISTS THAT PROVISION OF THE MINIMUM ESSENTIALS FOR RESETTLEMENT (I.E., COMPARABLE QUALITY LAND, LAND CLEARING IF NECESSARY, TOOLS, FOOD SUPPORT UNTIL RESETTLED, ETC.) IS PREFERABLE TO PROVIDING FOR ALLNEEDS OF THE SETTLERS. PP SHOULD CAREFULLY CONSIDER ALTERNATIVE MODALITIES OF RESETTLEMENT AS WELL AS APPROACH CONSIDERED IN PID. AN ALTERNATIVE WHICH PROVIDES A LOWER LEVEL OF MATERIAL SUPPORT IS SEEN AS FEASIBLE. THE COMMITTEE RECOMMENDS, THEREFORE, THAT PP SHOULD REPHRASE THE PROJECT GOAL AND PURPOSE TO ELIMINATE ECONOMIC DEVELOPMENT OBJECTIVES, AND RE-ASSESS THE COSTS TO MAKE THEM APPROPRIATE TO THE REVISED OBJECTIVES.

5. THE RESETTLEMENT MODEL TO BE DESCRIBED IN THE PP AND THE RESULTS ACHIEVED DURING IMPLEMENTATION WILL BE A PRECEDENT, THUS OF INTEREST TO AID AND TO RESETTLEMENT SPECIALISTS. WE SUGGEST A CAREFULLY DESIGNED RESEARCH AND DEVELOPMENT COMPONENT TO

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RECORD THE KEY INCIDENTS AND TO PROVIDE SUFFICIENT INFORMATION FOR GOOD QUALITY INTERIM AND FINAL EVALUATIONS. THE RFD SHOULD BE BUILT INTO THE IMPLEMENTATION TO AVOID REDUNDANCY OF STAFFING AND SENSITIVITIES CAUSED BY INTERVENTIONS FROM OBSERVERS EXTERNAL TO THE ACTUAL RESETTLEMENT PROCESS.

6. REFTELS (A) AND (C) ADDRESSED FUNDING QUESTION. NEITHER THE DRAFT OHVS IDP PP NOR THE MAHANTALI RESETTLEMENT PID PROVIDE SUFFICIENT INFORMATION FOR AID/W TO MAKE AN UNAMBIGUOUS DETERMINATION OF FISCAL YEAR FUNDING LEVELS FOR EACH PROJECT. REFTEL (C), PARA. 2C TOTALS ARE BINDING AS MAXIMUM, HOWEVER. REQUEST THAT FISCAL YEAR LEVELS FOR EACH PROJECT BE WORKED OUT BETWEEN USAID/RBDO/DAKAR AND USAID/BAMAKO OHVS LIAISON OFFICE. WHILE PID IS APPROVED AT A MAXIMUM OF DOLS.18 MILLION, WE WOULD HOPE, GIVEN GUIDANCE PROVIDED ,ARA. 3 ABOVE, THAT A PP SUBMISSION FOR SUBJECT PROJECT MAY BE REALISTICALLY BUDGETED AT A LOWER LEVEL.

7. A COMPONENT CONTAINED IN AND COMMON TO BOTH PROJECTS WHICH REMAINS THE LEAST CLEAR, AND PERHAPS PRESENTS THE POTENTIAL FOR THE GREATEST VARIATION IN TERMS OF COST, IS THE PUBLIC HEALTH COMPONENT (PARA. 7A BELOW). WE REQUEST THAT USAID/DAKAR RBDO EXPLORE WITH USAID/BAMAKO OHVS LIAISON OFFICER THE MOST EFFECTIVE MANNER OF COVERING THE PUBLIC HEALTH COMPONENTS OF BOTH PROJECTS, (E.G., CAN ASSISTANCE TO OHVS UNDER IDP COVER SOME RESETTLEMENT HEALTH ACTIVITIES?). IN ADDITION, RESULTS OF DISCUSSIONS IN WASHINGTON WITH UNDP OFFICIALS ON MAY 14 ARE BEING REPORTED SEPTEL AND SHOULD BE USED IN EXPLORING FUNDING OPTIONS.

8. THE FOLLOWING INSTRUCTIONS ARE ALSO PROVIDED AS GUIDANCE TO THE PP DESIGN TEAM:

--- A. PID GAVE INSUFFICIENT ATTENTION TO HEALTH REQUIREMENTS OF THE POPULATION THAT MUST BE RESETTLED BECAUSE OF THE MAHANTALI DAM AND RESERVOIR. OF PARTICULAR CONCERN IS POTENTIAL FOR POSSIBLE INCREASED EXPOSURE OF RESETTLED POPULATION TO BLACK FLY VECTORS OF ONCHOCERCIASIS AND TO SCHISTOSOMIASIS TRANSMISSION SITES. WHILE WE REALIZE THAT ONCHO IS ALREADY ENDEMIC TO THE AREA, PROJECT SHOULD EXAMINE EFFECTS OF MOVE TO NEW SITES. FOLLOWING HEALTH ASPECTS SHOULD BE CONSIDERED IN PP DESIGN:

--- (1) HEALTH ASPECTS OF SITE SELECTION MUST BE GIVEN APPROPRIATE WEIGHT RELATIVE TO OTHER FACTORS. SITES SELECTED FOR RESETTLEMENT OF THE POPULATIONS WILL HAVE CONSIDERABLE IMPORTANCE IN CONTROLLING TRANSMISSION OF THESE DISEASES. THE MAHANTALI RESERVOIR WILL GREATLY REDUCE BLACK FLY BREEDING BEHIND THE DAM, BUT BREEDING SITES IN OTHER NEARBY STREAMS AND RIVERS WILL CONTINUE. CLOSE PROXIMITY TO THESE SITES CAN PROMOTE ONCHOCERCIASIS (RIVER BLINDNESS) TRANSMISSION AND LEAD TO SEVERE DISEASE IN INFECTED INDIVIDUALS. SIMILARLY, CLOSE PROXIMITY TO UNCONTROLLED SCHISTOSOMIASIS TRANSMISSION SITES WILL ENHANCE THE POTENTIAL FOR MULTIPLE REINFECTION, HEAVY WORM BURDENS AND LIKELIHOOD THAT SEVERE CLINICAL DISEASE WILL DEVELOP.

--- (2) DESIGN TEAM SHOULD INCLUDE A MEDICAL ENTOMOLOGIST OR OTHER EXPERT ON CONTROL OF VECTOR-BORNE DISEASES, AN EXPERT ON SCHISTOSOMIASIS CONTROL

AND A SANITARY ENGINEER. HEALTH ASPECTS OF THIS PROJECT SHOULD BE ASSESSED AND METHODS

RECOMMENDED FOR PREVENTING OR CONTROLLING POTENTIAL ADVERSE HEALTH EFFECTS AMONG POPULATIONS THAT ARE TO BE RESETTLED. ALTHOUGH PARTICULAR ATTENTION SHOULD BE GIVEN TO ONCHOCERCIASIS AND SCHISTOSOMIASIS, OTHER DISEASES WHICH MAY BE AFFECTED SHOULD BE CONSIDERED. HEALTH EXPERTS SHOULD PROPOSE ALTERNATIVE CONTROL MEASURES AND PROVIDE COST-EFFECTIVENESS ESTIMATES. (COMMENT: DR. STOCKARD PLANS TO VISIT WORLD BANK TO DISCUSS ITS HEALTH PROJECT IN WEST MALI SOON. HE WILL CABLE RECOMMENDED ADJUSTMENTS TO DESIGN TEAM COMPOSITION (HEALTH MEMBERS) IF INDICATED BY INFORMATION RECEI .)

---B.

SEE NEGATIVE DETERMINATION NOT APPROPRIATE FOR THIS PROJECT. RESETTLEMENT PROJECTS ARE SPECIFICALLY NOTED IN REGULATION 16 SECTION 216.2(D) AS A CLASS OF ACTION NORMALLY HAVING A SIGNIFICANT EFFECT ON THE ENVIRONMENT, AND AN ENVIRONMENTAL ASSESSMENT (EA) WILL BE REQUIRED. IN THIS CASE, THE EA WILL BE COMPOSED OF THE AGGREGATE OF THE INDIVIDUAL STUDIES THAT ARE ALREADY PLANNED TO BE UNDERTAKEN AS IDENTIFIED IN THE PID AND IN ACTIVITIES IDENTIFIED AS RESULT OF PUBLIC HEALTH GUIDANCE IN THIS CABLE (ABOVE). WE REQUEST THAT MISSION SUBMIT COPIES OF THE TERMS OF REFERENCE (TOR) FOR THE VARIOUS STUDIES AND ANTICIPATED COMPLETION DATES FOR REVIEW PURPOSES AS SOON AS POSSIBLE BUT NO LATER THAN SUBMISSION OF THE PP FOR REVIEW BY BUREAU ENVIRONMENTAL OFFICE. THIS WOULD CONSTITUTE COMPLIANCE WITH REF. 16 SECTION 216.3(A) (4) (1) AND (11). REVIEW WOULD ALSO CLARIFY AMBIGUOUS WORDING SUCH AS CONTAINED IN PID PAGE 32 QUOTE THIS STUDY SHALL ENCOMPASS ALL ENVIRONMENTAL ISSUES NOT UNCOVERED (OR COVERED) BY THE OTHER PRELIMINARY STUDIES END QUOTE. IN ADDITION, A COVENANT OR A CONDITION PRECEDENT WILL BE INCLUDED IN THE OBLIGATING DOCUMENT TO MAKE SURE THAT THESE ENVIRONMENTAL STUDIES ARE SATISFACTORILY COMPLETED AND THAT RECOMMENDATIONS FOR MITIGATING ADVERSE ENVIRONMENTAL IMPACTS ARE TAKEN INTO ACCOUNT DURING THE FINAL DESIGN OF RESETTLEMENT ACTIVITIES PRIOR TO DISBURSEMENT OF FUNDS FOR PROJECT ACTIVITIES OTHER THAN STUDIES.

--- C.

ECONOMIC ANALYSIS: GUIDANCE ON DRAFTING AN APPROPRIATE COST EFFECTIVENESS ANALYSIS WAS PROVIDED TO LEVIS LUCHE BY DR/ARD. A COMPARISON OF THE COST EFFECTIVENESS OF THE ALTERNATIVE APPROACHES SHOULD BE INCLUDED IN THE PP.

--- D.

COMMITTEE RECOMMEND" --;AT PP PARTICULARLY ADDRESS PROBLEM OF TENDENCY OF RESETTLEMENT ACTIVITIES TO CREATE PROLONGED DEPENDENCY ON PROJECT PROVISIONS (I.E., FOOD, CONSTRUCTION MATERIALS, LAND CLEARING, ETC.), AND THAT STEPS BE TAKEN IN IMPLEMENTATION PLAN TO AVOID OR MINIMIZE THIS PROBLEM.

--- E.

COMMITTEE AGREES WITH RECOMMENDATION OF SPECIALISTS IN BINGHAMTON NEW LANDS SETTLEMENT WORKSHOP THAT PROJECT HAVE A FLEXIBLE IMPLEMENTATION PLAN TO PERMIT TAKING ADVANTAGE OF OPPORTUNITIES AS THEY ARISE AND LEARNING FROM EXPERIENCE GAINED DURING EARLY MOVES. CAREFUL CONSIDERATION SHOULD BE GIVEN TO PHASING MOVEMENTS OF VILLAGERS OVER A LONGER TIME SPAN. THIS WOULD ALLOW EXPERIMENTATION WITH A

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--- VARIETY OF APPROACHES, LIMIT THE SCALE OF ERRORS,
--- AND MAKE MANAGEMENT WORKLOADS EASIER TO BEAR.
--- THIS IMPLIES ALSO A HIGHER CONTINGENCY ALLOWANCE
--- THAN NORMALLY DESIGNED INTO A PROJECT. WE SUGGEST
--- 20 PERCENT.

--- F. THE PP SHOULD ATTEMPT TO ESTIMATE THE DEGREE TO
--- WHICH THE VILLAGERS TO BE RESETTLED WILL BE EMPLOY-
--- ED AS CONSTRUCTION WORKERS OR IN SOME OTHER WAY
--- HAVE THEIR NEEDS MET BY THE ACTIVITIES CONNECTED
--- WITH THE CONSTRUCTION OF THE DAM. THIS COULD
--- POSSIBLY REDUCE THE COST OF THE PROJECT. THE PP
--- DESIGN TEAM SHOULD ALSO EXPLORE THE POSSIBILITIES
--- OF THE VILLAGERS' TAKING ADVANTAGE OF THE ECONOMIC
--- OPPORTUNITIES ARISING FROM OHVS DEVELOPMENT PROGRAM
--- THUS ENABLING THEM TO IMPROVE THEIR QUALITY OF LIFE
--- IN A MINIMUM COST MANNER. THIS COULD LEAD TO
--- PROSPECTS FOR OR IF POSSIBLE, GUARANTEES OF ACCESS
--- TO CONSTRUCTION JOBS, MARKETING CONCESSIONS, FISH-
--- ING RIGHTS, RECREATION AGRICULTURE OPPORTUNITIES
--- AROUND THE RESERVOIR, ETC.

--- G. THE PP SHOULD INVESTIGATE EXISTING LAND TENURE
--- SITUATION AND DESCRIBE THE MANNER IN WHICH THE
--- SETTLERS WILL BE ASSURED TENURE ON LAND OF EQUAL OR
--- BETTER QUALITY THAN THE LAND ABANDONED AND WHERE
--- RELEVANT THE IMPLICATIONS FOR HOST POPULATIONS'
--- RIGHTS TO LAND. ADEQUATE TECHNICAL ANALYSIS OF
--- QUALITY OF THIS LAND FOR AGRICULTURE PRODUCTION
--- SHOULD BE PROVIDED.

--- H. INTER-RELATIONSHIP OF SETTLERS AND HOST POPULATION
--- SHOULD BE EXPLORED AND METHOD OF RESOLUTION OF
--- POTENTIAL PROBLEMS DESCRIBED IN PP. PP SHOULD BE
--- PARTICULARLY CONCERNED WITH BENEFITS ACCRUING TO-
--- SETTLERS WHICH ARE NOT SHARED BY HOST POPULATION.

--- I. PID DISCUSSED CURRENT ECONOMIC ROLE OF WOMEN.
--- EXPERIENCE ON VOLTA DAM INDICATES RESETTLEMENT CAN
--- HAVE NEGATIVE IMPACT ON WOMEN'S TRADITIONAL PRACTICES
--- (I.E., LAND TENURE RIGHTS GRANTED TO MALE
--- FAMILY CHIEF CAUSED WOMEN TO LOSE GARDEN PLOTS).
--- PP SHOULD DESCRIBE HOW CURRENT ECONOMIC ROLES OF
--- WOMEN WILL BE PROTECTED AT NEW SITES. DIRECT SOLI-
--- CITATION OF VIEWS FROM WOMEN OR WOMEN'S GROUPS IS
--- RECOMMENDED.

--- J. THE PID DOES NOT ADEQUATELY ADDRESS THE AGRICULTURE
--- PROBLEMS ASSOCIATED WITH RESETTLEMENT. A VERY
--- CAREFULLY COORDINATED EFFORT NEEDS TO BE WORKED OUT
--- ON DEALING WITH A MYRIAD OF AGRICULTURAL PROBLEMS
--- WHICH WILL ARISE (ALL THE WAY FROM DETERMINING
--- FIELD SIZES AND ASSESSING SOIL QUALITY TO PROVIDING
--- TECHNICAL ASSISTANCE). AN AGRICULTURE SPECIALIST
--- SHOULD BE INCLUDED ON THE PP DESIGN TEAM.

9. COPIES OF ISSUES PAPERS GIVEN TO LEWIS LUCKE AT TIME OF
REVIEW CAN PROVIDE ADDITIONAL DETAILS. STOESEL

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AID 1020-28 (1-73)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

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

Life of Project:
From FY 84 to FY 88
Total U.S. Funding \$17,163,000
Date Prepared: 20 February 1984

Project Title & Number: MANANTALI RESETTLEMENT 688-0233

PAGE 1

NARRATIVE SYNOPSIS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>To help the government of Mali move 11,000 people out of the area which will flood behind the Manantali dam beginning on July 1987.</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>11,000 villagers resettled</p>	<p>(A-3)</p> <p>Resettlement Project Unit (RPU) including Technical Assistance team, Malian government, OMVS, and USAID reports.</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <p>RPU, OMVS, USAID, Project Contractors, and target population effectively collaborate and efficiently execute their tasks according to the planned timetable.</p>

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p> <p>To resettle the displaced people in a manner which minimizes their hardship and helps sustain their current standard of living.</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <ol style="list-style-type: none"> 1. Acceptable dwellings and other household structures rebuilt. 2. Potable water supplied in adequate amounts. 3. Access tracks constructed. 4. Fields cleared. 5. Village infrastructure built. 6. Government services operating. 7. Losses compensated. 	<p>(B-3)</p> <ol style="list-style-type: none"> 1. Visual inspection 2. Site visits 3. Yearly statistics 4. Monitoring and evaluation reports 5. Food aid records 	<p>Assumptions for achieving purpose: (B-4)</p> <ol style="list-style-type: none"> 1. Sufficient time remains to implement resettlement prior to filling of Manantali reservoir. 2. Technical studies coordinated with village preferences to choose resettlement sites. 3. Soils in resettlement areas equal or better than those in reservoir zone. 4. Adequate water resources found in contiguity with adequate soil resources in self-selected resettlement zones. 5. Logistical difficulties resolved under cost and time constraints. 6. Food aid available. 7. Fair compensation rates can be negotiated between all parties concerned. 8. GRM can supply health services. 9. Contractors perform to terms of contract documents. 10. No unforeseen technical difficulties arise. 11. Traditional land tenure system affords resettling villagers access to new zones and enables equitable division of new land. 12. Competition for land resources at self-selected sites between resettling villagers and temporary migrants minimized by project committee.

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PROJECT DESIGN SUMMARY
 LOGICAL FRAMEWORK

Life of Project:
 From FY 84 to FY 88
 Total U.S. Funding \$17,163,000
 Date Prepared: 20 February 1984

Project Title & Number: MANANTALI RESETTLEMENT 688-0233

NARRATIVE SUMMARY	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>1. GRM Manantali Resettlement Project Unit (RPU) set up.</p> <p>2. Manantali RPU staff offices and lodgings built.</p> <p>3. New village sites chosen, planned, and cleared.</p> <p>4. Limits of reservoir demarcated.</p> <p>5. Access tracks to new villages constructed.</p> <p>6. Site warehouse built.</p> <p>7. Wells dug or drilled.</p> <p>8. Village infrastructure built.</p> <p>9. Village cultivated fields cleared.</p> <p>10. Village dwellings and other household structures rebuilt.</p> <p>11. Tree nursery operating.</p> <p>12. People transferred to new villages.</p> <p>13. World Food Program commodities nutritionally sustaining settlers.</p>	<p>Magnitude of Output (C-2):</p> <ul style="list-style-type: none"> - 7 GRM civil servants and all RPU contract personnel complete resettlement tasks and are reassigned or seek other employment. - 12 offices, 4 transit units, 1 conference room, and 9 lodgings built. - 500 hectares cleared and new villages sited thereupon. - Mark sited every 500 meters around reservoir periphery. - 220 kilometers of tracks constructed or upgraded. - 8 warehouses built. - at least 72 boreholes/ cisterns constructed. - 1600 m² of administrative, forestry, veterinary, and health infrastructure built at New Bamafele. - 5000 hectares cleared for cultivation. 	<p>(C-3)</p> <ul style="list-style-type: none"> - Visual monitoring - Site visits - Monitoring reports - RPU records - Progress reports by contractors - WFP records - AID implementation reports 	<p>Assumptions for achieving outputs: (C-4)</p> <ol style="list-style-type: none"> 1. Qualified personnel to perform studies and staff project management 2. Most materials for village reconstruction available locally. 3. GRM accepts management role of RPU, USAID, its contractors, and its sub-contractors. 4. Dam construction does not advance its schedule. 5. Able contractors execute construction activities. 6. UNDP studies provide most information needed for final project planning and implementation 7. Sufficient sites, which meet minimal standards for water and soils availability in combination with favorable host populations willing to provide land tenure access exist. 8. Insurmountable physical, logistical, or cost difficulties do not exist to access road construction. 9. Wages are sufficient incentive to employ adequate work crews for construction activities. 10. Food aid is delivered and distributed with minimal loss. 11. Weather conditions are favorable in first years of resettlement to allow replication of pre-existing production systems.

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PROJECT DESIGN SUMMARY
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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>14. Production system reestab-</p>	<p>Magnitude of Outputs: (C-2)</p> <ul style="list-style-type: none"> - 4500 houses, 3000 granaries, 450 cookhouses, 300 livestock shelters, 650 chicken pens, 1000 concession walls, and 1000 latrines. - 1 hectare nursery constructed with 30,000 saplings growing. - 11,000 people and their belongings moved to new village sites. - 4,400 tons of WFP foodstuff distributed to settler families. - Crops being grown on 5,000 or more hectares of new fields, gardens established. 	<p>(C-3)</p>	<p>Assumptions for achieving outputs: (C-4)</p>

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs: (D-4)
USAID: \$17,163,000 grant CONSTRUCTION: 10,215,000	- Construction completed	- Site monitoring	- Bid and contracting documents can be completed in reasonable time
Staff offices: 84,000	- Technical assistance team on site	- Visual inspection	- Bid and contracting processes for construction activities and TA team are not delayed
Staff lodging: 433,000	- Villagers compensated for losses	- Contracting documents	- Competent contractors are interested and bid
Site Warehouses: 205,000	- Evaluation completed	- Procurement documents contractor reports	- Commodities procured in a timely fashion
Wells: 3,426,000	- 4,400 tons of food distributed	- RPU reports	- RPU and TA personnel positions stable with no usual turnover
Tracks: 2,214,000	- RPU personnel assigned	- AID reports	- OMVS, GRM, and USAID provide continual support to project
Land Clearing: 588,000	- New village sites and farm fields acquired	- WFP reports	- Settlers involved in planning and execution of reconstruction and transfer
Village Reconstruction: 2,701,000	- Settlers help with reconstruction and resettlement	- Payment vouchers	
Village Infrastructure: 564,000		- Certifications by AID engineers	
Operating Expenses: 1,626,000			
<u>TECHNICAL ASSISTANCE:</u> 3,280,000			
<u>COMPENSATION:</u> 281,000			
<u>MONITORING/STUDIES/SPECIAL SERVICES:</u> 764,000			
<u>EVALUATION:</u> 488,000			
WORLD FOOD PROGRAM: 5,480,000			
GRM: 3,364,000			

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5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3. applies to projects funded from ESP.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project;
 (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that amount)?

Through submission of annual presentation and a project notification to Congress

Yes

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,00, will there be

- (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance? Yes
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance? N/A
4. FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.) N/A
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project? N/A

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6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.
- Requirement for timely implementation resulted in both OMVS and AID decision to make this a bilateral project in a regional development effort. Coordination with other donors has to date been very satisfactory.
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
- The government of Mali has agreed to have private firms or organizations execute all project activities.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- U.S. firms will be able to bid on all construction activities, notice of which will be published in Commerce Business Daily.

9. FAA Sec. 612(b), 636(h);
FY 1982 Appropriation
Act Sec. 507. Describe
steps taken to assure
that, to the maximum
extent possible, the
country is contributing
local currencies to meet
the cost of contractual
and other services, and
foreign currencies owned
by the U.S. are utilized
in lieu of dollars. The GRM will contribute local
support costs as permitted by
national budgetary limitations.
No U.S.-owned currency is
available for support of this
project.
10. FAA Sec. 612(d). Does
the U.S. own excess
foreign currency of the
country and, if so, what
arrangements have been
made for its release? No
11. FAA Sec. 601(e). Will
the project utilize
competitive selection
procedures for the
awarding of contracts,
except where applicable
procurement rules allow
otherwise? Yes
12. FY 1982 Appropriation Act
Sec. 521. If assistance
is for the production of
any commodity for export,
is the commodity likely
to be in surplus on world
markets at the time the
resulting productive
capacity becomes
operative, and is such
assistance likely to
cause substantial injury
to U.S. producers of the
same, similar or
competing commodity? N/A
13. FAA 118(c) and (d).
Does the project comply
with the environmental
procedures set forth in
AID Regulation 16? Does
Pre-implementation studies
have taken all negative
environmental aspects into
consideration and sought to
minimize same.

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the project or program take into consideration the problem of the destruction of tropical forests?

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?

No U.S. funds will be handled by GRM employees. The technical assistance team will have a financial manager as a member who will control all project operating expenses.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves

The project area is rural and two committees will be set up which include rural villagers. People forced to resettle by the dam construction will receive first crack at all employment opportunities generated by activities financed by the project. A professional female sociologist has been made a senior staff member of the Resettlement Unit with particular responsibility for the concerns of women.

otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

Yes

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

Yes, to the extent possible.

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?

The 25% requirement is waived due to Mali's status as one of the world's least developed countries.

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e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.. defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than \$100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.

Yes. Satisfactory justification will be provided to Congress. The recipient country is one of the relatively least developed.

f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

N/A. This is not a development project per se. The post-resettlement phase may set the stage for economic growth.

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage

The project has been designed with full participation of the beneficiary population and Malian civil servants in each government ministry which is a member of the National OMVS Committee.

institutional development;
and supports civil
education and training in
skills required for
effective participation in
governmental processes
essential to self-government.

2. Development Assistance Project
Criteria (Loans Only)

- a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A
- c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible the private sector? Does the project provide for monitoring under FAA Sec 624(g)? N/A

3. Economic Support Fund
Project Criteria

- a. FAA Sec. 531(a). Will this assistance promote economic or political N/A

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stability? To the extent possible, does it reflect the policy directions of FAA Section 102?

- b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities? N/A
- c. FAA Sec. 534. Will ESP funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives? N/A
- d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

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N° /CAB-MOIT
0368

BAMAKO, LE **20** MARS 1982

*Le Ministre du Développement
Industriel et du Tourisme*

Monsieur le Chef de l'Agence Américaine pour
le Développement International.

BAMAKO

Objet : Recasement des populations
touchées par la retenue du barrage
de Manantali.

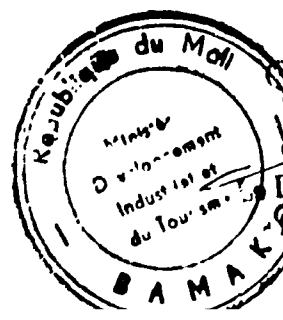
Monsieur,

Me référant au projet mentionné en objet, j'ai l'honneur
et le plaisir de vous informer que nous approuvons avec une réelle satis-
faction toutes les actions de développement entreprises par votre Agence
dans notre pays en particulier le volet recasement des populations de la
retenue du barrage de Manantali.

Nous approuvons très sincèrement l'ensemble du programme
d'étude et d'exécution de ce projet. Les différentes phases des opérations
ainsi que le déblocage des fonds par étapes seront déterminées de commun
accord entre votre Agence à BAMAKO et nos services techniques et administra-
tifs chargés de suivre le projet.

Compte tenu de l'importance de ce volet dans le programme
général de la construction du barrage, nous espérons que vous mettrez tout
en oeuvre afin que les opérations se déroulent dans les délais arrêtés
dans le planning.

Je vous prie d'agréer, Monsieur, l'assurance de ma consi-
dération distinguée./.


Pour le Ministre
en par Délégation
Directeur de Cabinet
Ousmane K. K. RF

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8.10.

**DIRECTION NATIONALE DE L'HYDRAULIQUE
ET DE L'ENERGIE**

BAMAKO, LE

Le Directeur Général de l'Hydraulique
et de l'Energie

- BAMAKO -

à

Monsieur le Directeur National
du Programme Alimentaire Mondial

- BAMAKO -

Objet : Demande de Support Alimentaire
aux populations de Manantali.-

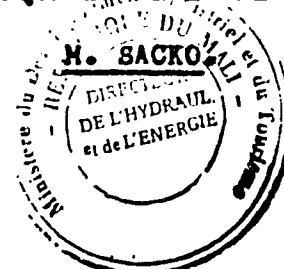
J'ai l'honneur de porter à votre connaissance qu'environ 13 000 personnes devront être déplacées dans le cadre de la construction du barrage de Manantali.

Le transfert de ces personnes des anciens villages aux nouveaux sites pose d'énormes problèmes dans tous les domaines notamment dans celui de l'agriculture. Pendant la phase d'adaptation aux nouvelles conditions de vie un support alimentaire aux populations s'avère nécessaire.

Je vous demanderais de bien vouloir nous accorder ce support dans votre programme pendant 39 mois à compter d'Octobre 1983 pour 15 000 personnes compte tenu de la croissance rapide de la population dans cette zone, et des incertitudes liées au recensement.

Une suite urgente m'obligerait.

**LE DIRECTEUR GENERAL ADJOINT DE
L'HYDRAULIQUE ET DE L'ENERGIE**



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MINISTÈRE D'ÉTAT CHARGÉ DE L'ÉQUIPEMENT

REPUBLIQUE DU MALI
Un Peuple - Un But - Une Foi

DIRECTION NATIONALE DE L'HYDRAULIQUE
ET DE L'ÉNERGIE

**** UNOFFICIAL ****

8.12.

COMPTE RENDU DE RÉUNION

Le Lundi 12 Mars 1984 s'est tenue une importante réunion dans la salle de réunion de la DNHE sous la présidence de Monsieur Sacko (Directeur Adjoint de la DNHE)

- Étaient conviés à cette réunion les départements et services suivants :

- Ministère du Plan
- Ministère chargé du Développement Rural
- Ministère des Affaires étrangères
- Ministère de l'Intérieur
- Ministère des Travaux publics
- Ministère des Finances
- Ministère de l'Agriculture
- Direction Nationale des Eaux et Forêts

- Étaient effectivement présents à la réunion

- Mr. - Sacko (Directeur Général Adjoint DNHE) (Président de séance)
Bouba Camara, Chef de division Énergie et barrage - DNHE
K. Robert Dembélé, Chef Projet Recasement Manantali - DNHE
Yacouba Konaté PRM - DNHE
Djibril Diallo PRM - DNHE
Yelocuma Ouloguem - Ministère de l'Intérieur
Mme Coulibaly Ouleye Tounkara - Ministère des Finances
Aboulamine Barthé - DNEF
Sambou Diakité - DNEF
Mahamane Amadou Maïga, Ministère des Affaires Étrangères
Lassana Sacko, Ministère des travaux publics (DNUC)

- Étaient absents :

Le Ministère de l'Agriculture.

Le Ministère du Plan

L'Ordre du jour était : Examen du document de projet élaboré par l'USAID/Éke relatif au recasement des populations de Manantali

La séance a été ouverte par Mr. Sacko DGA de la DNHE qui a rappelé l'ordre du jour et passa la parole successivement aux différents délégués qui ont tous fait chacun en ce qui le concerne des remarques sur le document à l'exception des délégués des Ministères des Finances et de l'Intérieur qui estiment qu'ils n'ont pas reçu le document à temps et de ce fait se proposent de faire parvenir à la DNHE leurs observations dans les meilleurs délais.

Après examen approfondi du document par les participants, les discussions se sont focalisées sur les points saillants du document à savoir :

1. - Inventaire exhaustif des activités à mener et les enveloppes affectées à ces activités

- La stratégie d'exécution de l'ensemble de ces activités
- La structure proposer pour une exécution correcte du projet
- Les rapports de cette structure d'exécution avec l'USAID.

.../...

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- Le Système de compensation spéciale pour le dédommagement des Populations victimes.
- Les primes affectées aux cadres du Gouvernement Malien détachés au Projet

II Tout au long de ces discussions les participants ont fait des observations de forme sur plusieurs passages du document.

I DISCUSSIONS DES POINTS SAILLANTS DU DOCUMENT

a) Inventaire exhaustif des activités à mener et les enveloppes affectées respectivement à ces activités.

- Les participants ont approuvé l'ensemble des activités à mener sur le terrain. Toutefois, la réunion a formulé des inquiétudes sur le volet sanitaire qui lui paraît trop limité selon le document américain. Aussi les participants suggèrent en souvenir de ce qui s'est passé et continue de se passer à Sélingué, d'une part et compte tenu du fait que le Projet PDI (Projet de Développement Intégré) de l'ONVS n'en est qu'à stade de balbutiement (Projet qui comporte bien sur un volet sanitaire) d'autre part, que l'US-AID amplifie d'avantage son intervention au niveau de la santé.

Quant au montant des différentes enveloppes affectées à chacune des activités, les participants ont émis une réserve estimant que les renseignements disponibles dans le document ne leur permettaient de se prononcer à ce sujet.

A ce niveau la DNHE informe les participants que chaque activité a fait l'objet d'études approfondies dont les résultats sont consignés dans des annexes qui leur seront soumis dès finitions de leur traduction en langue française.

En outre les participants ont été informés que l'US-AID est d'accord de procéder aux réaménagements de son document à la lumière des discussions ultérieures sur les annexes s'il n'était besoin étant entendu que la procédure actuelle vise à une accélération de l'approbation du document par les parties maliennes et américaines face à la contrainte de temps qu'impose le calendrier de construction du barrage.

b) La stratégie d'exécution du Projet.

Cette stratégie se résume essentiellement à faire exécuter le maximum des travaux par les entreprises privées ou étatiques sur la base d'un contrat.

Cette stratégie jugée conforme à la nouvelle orientation de la politique Gouvernementale d'encourager et de promouvoir le secteur privé, fut approuvée par les participants.

c) La Structure d'exécution du Projet

Après examen approfondi de l'Organigramme proposé dans ses différentes articulations, les participants l'ont approuvé. Toutefois la réunion souhaite avoir d'amples informations de la part de l'US-AID sur les rapports de compétences qui existent entre d'une part le Directeur malien du projet et son homologue de l'US-AID et entre le Directeur malien et l'expert comptable de l'AID d'autre part.

Par ailleurs pour assurer un meilleur fonctionnement de ladite structure et prévenir tout grincement de cette mécanique, les participants suggèrent ce qui suit :

En ce qui concerne le paiement des contrats directs, passés entre les différentes entreprises et l'US-AID, il s'effectuera sur la double autorisation du Directeur malien et de son homologue de l'US-AID.

Concernant les dépenses de fonctionnement, les paiements se feront sous la double signature du Directeur malien et de l'expert comptable de l'AID.

Les fonds de fonctionnement seront déposés dans une banque disponible à Malantali et toute dépense supérieure à 20.000 FM (VINGT MILLE FRANCS MALIENS) s'effectuera par chèque portant la double signature du Directeur malien et de l'expert comptable de l'AID.

.../...

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d) Au chapitre des compensations sociales pour le dédommagement des Populations Les participants ont approuvé cette approche et émis le vœux que cela se contractise entièrement.

Toute la réunion n'a pas approuvé le dédommagement partiel de l'Eglise Protestante de Féniskéniéko. Vu que la partie malienne n'a pas été associé à l'estimation de l'édifice en question. Aussi la réunion suggère que les dédommagements des Populations fassent l'objet d'un accord entre les 2 parties.

e) Les primes affectées aux cadres du Gouvernement malien évoluant dans le Projet Les participants ont reconnu les contraintes qu'impose la cherté de vie à Manantali et le climat social astringents du fait de la proximité des agents de l'OMVS si justement soulignés par l'AID dans son document. Toutefois les participants à la réunion estiment que les primes proposées pour les cadres sont insuffisantes et suggère à l'AID de revoir en hausse les primes des agents afin de les mettre dans les meilleures conditions matérielles et morales de travail. Il devrait être également tenu compte de la couverture sanitaire des agents sur le terrain.

II OBSERVATIONS DE DETAILS

Tout au long des discussions les participants ont fait des remarques suivantes :

1°) Page 2

Les participants ne sont pas d'accord avec l'expression "soutien très limité à la santé publique" qui minimise de trop l'aspect sanitaire. Aussi à la 1ère ligne il serait mieux d'ajouter sites pour les villages et les champs de culture.

2°) Page 3

1.8 Conditions préliminaires/conventions

La réunion demande des éclaircissements sur le point c)

3°) Page 6 (2ème chapitre)

Les Eaux et Forêts trouvent que la DNEF est administrativement responsable de Déboisement

4°) Page 9 (2ème chapitre)

La réunion a mal accueilli le passage "ils ont été initiés à l'alcool....vendre leurs services" et de le supprimer

3ème Chapitre

La réunion suggère la reformulation suivante : pour éviter la répétition de ce qui s'est passé à Sélingué une étude archéologique sera menée dans la zone d'inondation du barrage de Manantali a fin d'identifier d'éventuels sites archéologiques.

5°) Page 10 (stratégie de l'AID)

1er Chapitre

réduire au minimum le rôle de dirigisme au lieu de rôle de direction de la CEM

6°) Page 14

Un secrétaire bilingue (Anglais Français) au lieu de deux secrétaires de Direction.

7°) Page 15

La réunion demande à l'AID de préciser les rapports de compétence entre le Chef Projet américain et l'expert comptable.

8°) Page 17

Constatation d'une contradiction dans le document :

Il est écrit à la page 17 que les habitations villageoises seront construites en briques de banco stabilisé alors qu'à la page 37 apte 1ère ligne il est dit que les habitations seront en banco compressé, mais non stabilisé.

9°) Page 21 (2.8.15 Assistance technique)

5ème paragraphe : la plupart des tâches au lieu des responsabilités.

.../...

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10°) Page 26

2ème paragraphe

Le Directeur de l'Hydraulique doit être membre du Comité CLAP

11°) Page 36 (2 8 77 Construction logement)

La réunion suggère qu'en plus de la construction des murs des cases d'habitations que la confection des toitures soit également mise à la charge du contractant.

12°) Page 44 2 8 3 5 Compensation/ Indemnités spéciales

La réunion considère que la décision de payer 20.000 dollars à la mission protestante en dédommagement de ses bâtisseurs est unilatérale et ne saurait obtenir l'accord du Gouvernement que sur la base d'une étude menée conjointement par AID/Bamako et le Gouvernement du Mali.

13°) Page 51

S'agissant de la ventilation budgétaire, la réunion estime les données disponibles dans le document insuffisant pour un jugement valable.

En Divers : La réunion suggère à l'AID d'adopter une terminologie conforme à celle adoptée par la DNEH dans l'élaboration de ses documents.

Conclusion

Le document est accepté sous réserve que la porte reste ouverte pour les négociations sur la base des annexes relatives aux différents volets./.