PD-AAK-276 688-0215 (220

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT REVIEW PAPER FACESHEET

1. TRANSACTION CODE: [ ] A ADD, C CHANGE, D DELETE — PRP

2. DOCUMENT CODE: 2

3. COUNTRY/ENTITY: MALI

4. DOCUMENT REVISION NUMBER: [ ]

5. PROJECT NUMBER (7 digits): 688-XXXX

6. BUREAU OFFICE: A SYMBOL: AFR; B CODE: 06

7. PROJECT TITLE (Maximum 40 characters): First Region Integrated Rural Devel.

8. PROPOSED NEXT DOCUMENT: A [3] PP; B DATE: MM 06 YY 77

9. ESTIMATED FY OF AUTHORIZATION OBLIGATION: A INITIAL FY 78; B FINAL FY 80

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L.C.	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L.C.	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	(800)	(400)	(1,200)	(3,474.5)	(936.9)	(4,411.4)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		96	96		396	396
OTHER DONOR(S)						
TOTALS	800	496	1,296	3,474.5	1,332.9	4,807.4

11. PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. FIRST FY 78 F. GRANT	E. FIRST FY 78 G. LOAN	LIFE OF PROJECT H. GRANT	LIFE OF PROJECT I. LOAN
(1) FN	110	200		1200		4,411.4	
(2)							
(3)							
(4)							
TOTAL				1200			

12. PROJECT PURPOSE (Maximum 480 characters)

"X" IF DIFFERENT FROM PID [ ]

To promote rural development in the First Region of Mali through opening up the area, improving agricultural production, increasing cattle production and extending health services.

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

[1] 1 - NO 2 - YES

14. PLANNING RESOURCE REQUIREMENTS (Staff/Funds)

(See Project Implementation Plan)

15. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Ronald D. Levin

TITLE: Country Development Officer

DATE SIGNED: MM 12 DD 01 YY 76

16. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 12 DD 03 YY 76

AID 1330-3 (3-78)

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BAMAKO

December 1, 1976

MALI: FIRST REGION INTEGRATED RURAL DEVELOPMENT

PART I - PRIORITY AND RELEVANCE

A geographically isolated country, with limited exploitable resources, the Republic of Mali must concentrate its efforts for economic viability on its rural areas in agricultural and livestock production. The Government of Mali (GOM) has set as its number one priority self-sufficiency in cereals production. In some respects Mali could be considered self-sufficient in cereals production when rains are adequate and timely. That is to say that Mali can grow sufficient cereals to feed its population, but not necessarily to build up a reserve to meet an emergency of adverse weather. This self-sufficiency, however, is not uniform throughout the country and the most isolated regions could be in deficit while others may have a surplus.

This condition, in large measure, is a factor of transportation, or lack thereof. This was demonstrated during the drought emergency of 1972-74 when almost insurmountable difficulties were encountered in delivering relief grains to very isolated areas. Recognizing these problems, the GOM wishes to develop a uniform self-sufficiency throughout the country and, where possible, build up reserves and an export capacity. The proposed project is to address itself to the first of these concerns, i.e., developing a regional self-sufficiency in cereals production, among other concerns.

The First (or Kayes) Region of Mali is an isolated area of approximately 128,000 square kilometers. The Region's main link (and only surface link during the rainy season) with other parts of Mali and other countries is the rail line which runs from Bamako to Dakar, Senegal. Because of the rail line and the fact of isolation, the First Region had until recently been relegated to a relatively low priority status for development investments by both the Government of Mali and the donor community.

Lying as it does within the Senegal River Basin, the Region is hoping to derive significant benefit from the development program being coordinated by the Senegal River Basin Development Authority (the OMVS). Because of this development program, which is in the feasibility issues stage and securing donor pledges of support, the DAP for Mali made the following remarkable comment: "Once the Manantali Dam scheme is underway, both the market and transport situations may change rather rapidly. The northwest /First Region/ in particular will benefit from the OMVS program for the Senegal River basin... For the time being western Mali must remain somewhat neglected". While the first part of that statement may be true, the second part cannot be accepted. Though the Senegal River flows through the Region, and the two major tributaries forming the river (the Bafing and Bakoye) flow through parts of the Region, one cannot expect these facts to be the basis for major development affecting the majority of the population in the near future. It is also true that another major tributary of the Senegal flows through part of the Region and forms part of the border with the Republic of Senegal. This

tributary, the Falémé, however, will not provide the basis for major development until considerable infrastructure is developed. This would include water impoundment for irrigation and/or flood control at some future, unspecified date. If the statement of the DAP is accepted, no development in the Region can take place for another probable ten years.

Near term development in the First Region cannot depend on, nor should it wait for the construction of the Manantali Dam and the related infrastructure of the OMVS development program. It is possible to look to the southwestern part of the Region where there is potential for developing a diversified rainfed agriculture. This area has an annual rainfall of 1200-1300 millimeters, or nearly the highest incidence in all of Mali. Subsistence farmers in the area produce a variety of traditional crops including sweet potatoes, cassava and yams, and dryland cereal crops such as sorghum, millet, maize and fonio. "Operation Arachide" recently commenced work in the area and groundnuts will become an increasingly important cash crop in the future.

The project is to be located in the central arrondissement of the cercle of Keniéba, 240 kilometers south of Kayes, the regional capital. The cercle of Keniéba covers an area of 17,000 square kilometers and borders on Guinea and Senegal. The population is estimated to be about 85,000 people living in some 200 scattered villages. Approximately 40% live in and around the central arrondissement. Keniéba, the chef-lieu du cercle, has an estimated population of 5,000 people. About 98% of the economically active population in the cercle of Keniéba is engaged in subsistence agriculture, compared with 90% for the rest of Mali as a whole.

The major constraint to development in the cercle of Keniéba has been its isolation. The town of Keniéba is connected to Kayes by a seasonably passable road, though it is completely cut off from its regional capital at the height of the rainy season (mid-July to mid-September). There is also a seasonably passable road between Keniéba and Mahina on the rail line. This 150-kilometer road traverses mountain areas to the north and east of Keniéba. Though periodically cut off, there is year-round surface communication by this route. The main project area lies between Keniéba and the plain of Moussala on the Falémé River. There is a dry season track connecting Keniéba and the village of Moussala and the river, but the area is completely cut off from Keniéba and other areas during the rainy season. This area between Keniéba and the Falémé River has excellent potential for rainfed agriculture and a cattle industry utilizing the trypanotolerant N'Dama breed of cattle. It will be necessary, however, to desenclave the area and break its isolation.

Ecological conditions in the project area can be characterized as tall grass Guinea savannah. The dry season lasts four to five months and the overall rainfall pattern is similar to rainforest conditions. The area might well be classed as derived Guinea savannah. Broad-leafed trees predominate, being 30 to 50 feet high along water courses, but much shorter and more widely dispersed in other areas. These trees provide approximately a 15% canopy. Clumps of bamboo dot the landscape, especially in wetter upland areas with good drainage. Tall grasses, chiefly andropogun (both perennial and annual species), cover most of the area with pennisetum pedicallatum (an annual) on many laterite shields.

Livestock common to the project area are all of a trypanotolerant ecological type, since it lies within the main tse-tse fly belt. Glossina species in the area include morsitans, palpalis and tachinodes, although habitat sites have been little studied.

The project area can be said to possess near unlimited amounts of palatable grass during seven months of the year with adequate stock water, though the number of cattle suitable for grazing in the zone (trypanotolerant) are limited. Stockwater becomes a critical issue for at least three months of the year, but cattle can be easily moved to perennial water courses where both grazing and water are fully adequate.

Cattle in the area are primarily owned by Malinké farmers who most often hire Fulani herders. The cattle industry in the area could, therefore, be significantly expanded with only a modicum of production inputs. The chief constraint limiting cattle production relates to an apparent lack of appreciation, on the part of governments and donor entities, of the potential development possibilities of the N'Dama (trypanotolerant) breed of cattle under conditions of fly habitat.

Isolation, safe-water scarcity, inadequate food storage facilities and an abundance of invertebrate vectors of human disease have all contributed to the lack of development in the area. The health facilities within the cercle of Keniéba include the health center in the town of Keniéba which has 10 beds, a Chef de Médecine, deputy chef, pharmacy, maternity unit and staff. There are six rural dispensaries (at Dialafara, Sitakily, Dombia, Diafoudouba, Faraba and Falea), two catholic-run mission clinics (at Kassama

and Guerre-Gore) and two interdenominational clinics (at Keniéba and Guindissou). Although the facilities are modest for a cercle of 85,000 residents, those in charge appear to be hardworking, serious health professionals capable of delivering adequate service to all comers.

It is at this last point that the system falls short. There is little evidence that the health community extends its services beyond its walls. It is entirely likely that less than 10% of the Cercle inhabitants receive any services at all from the 11 facilities within the Cercle, and those who do must journey to the facility. This system relies entirely on self-diagnosis and the ability of the sick person to reach the facility.

The Mali Five-Year Development Plan (1974-78) stresses regional development with food crops and livestock production as priorities. The proposed project addresses these concerns directly while staying within the framework of the DAP "to concentrate /development in the rural sector/ in areas where water is not a seriously limiting factor, /and/ with attention to geographic distribution of population and food needs". Furthermore, it is a start "towards ... the perfection of a full crop program which includes food, cash crops and livestock". The proposed project also fits the GOM's attempt to make the traditional system operate as close to its potential as is feasible without a radical break from the past. It will provide for a gradual introduction of new technology (to the tradional farmer) and methods. This is an approach which was approved by the DAP as providing "considerable scope for donors" to participate.

The DAP also points out that "it is impossible to overstate Mali's critical shortage of /manpower/ skills." Therefore, the project is being designed to limit the demands on the available manpower in the area and to extend and expand the effectiveness of the skills and services already being provided.

The project relates directly to the sector goal of assisting Mali achieve self-sufficiency in food production and providing the rural poor with the means for improving their quality of life. The First Region is a grain deficit area, especially in rice, which now can be considered a luxury food. Discussions with regional officials (including the former and present governors) indicate that any and all excess rice production can easily be marketed through Kayes and/or Mahina, both of which are on the rail line. These areas can also provide the market for increased cattle production, especially the Mahina/Bafoulabé area. The project is not looking to be over-ambitious, but with its integrated approach can have a tremendous impact on a population which, even by the end of the rainy season, enjoys no revenue flow.

It needs to be emphasized at the outset that this is an integrated project aimed at development . In order to introduce development to the proposed project area it must first become accessible. Thus the need for the road component. Secondly, when first entering a region with a development project, one is often faced with imponderables which cannot immediately be fathomed. Therefore, a cautious approach is justified.

There are many apparent development opportunities for development assistance in the proposed project area. Any one of the components of

this project could be a separable entity in and of itself. However, because this is a first attempt by any donor in the area, the decision has been made that a three-pronged approach is most suitable to the conditions which prevail. Once experience has been gained and an evaluation of our successes has been prepared, it will then be possible to determine in which areas major investments can be made.

PART II - PROJECT DESCRIPTION

The proposed project will have four major components. The first will be the construction of an access road between Kenièba and the Falémé River and the Plain of Moussala and to improve the current road from Kenièba to Djibronia where it meets the Mahina/Bafoulabe road and the Dialafara/Kayes road. The second component is an agricultural component which will serve two purposes: First it will provide the necessary inputs to develop the Plain of Moussala into a major rainfed rice growing area, and secondly will introduce other crops for auto-consumption to improve nutrition. The third component envisaged is a livestock component which again will serve two purposes: First to introduce animal traction to the area; and secondly to expand the cattle industry by increasing the herd of N'Dama (trypanotolerant) breed of cattle. Finally, because no project in the area can ignore the concerns of health, the project will include a health component to address some of these concerns.

Rural Roads Component

The project is providing for the construction and improvement of approximately 100 kilometers of rural roads. The first segment is an access road of some 40 kilometers. The construction of this road will permit access to the plain of Moussala and the delivery of goods and services to the area as well as getting agricultural production out.

The second part of the road program will be to improve an existing 60 kilometer segment of road from Keniéba to Djibronia. Here the road forks with one fork continuing approximately 100 kilometers to Mahina and the other approximately 180 kilometers to Kayes. The Kayes branch has been under construction with financing from FAC. The final stretch from Dialafara to Djibronia is to be completed during the 1976-77 dry season.

The Directorate of Travaux Publics has established standards for roads in the area and these roads will meet or exceed these standards. For regional roads in the Kayes area (including Keniéba) Travaux Publics has established the following standards :

B-1 : An improved laterite surface all weather road with a travel way of 7 meters and 1 meter shoulders with adequate sub-base and base courses as well as adequate drainage structures. All bridges are constructed to two full lanes.

B-2 : A regular laterite surface all weather road with a travel way of 5 meters and 2 meter shoulders. The drainage is not designed to handle the peak days of the rainy season and might require rain barriers for short period of time. When bridges are included, they are probably one lane.

The road financed by FAC from Kayes to Djibronia, which connects with the Keniéba road and the Mahina road, is constructed to the B-2 standard, with no bridges included. Rain barriers have not been utilized and vehicles have attempted to traverse the road when perhaps they should not have. Because of this, deterioration in the road is already observable after only two years on that part completed. Considerable repair and maintenance is required in some areas.

Because of these types of problems, the roads proposed for this project will exceed the B-2 standards but not quite reach B-1 standards. The proposed roads are to be laterite surface all weather roads with a travel way of six meters and 1.5 meter shoulders. There will be adequate sub-base and base courses as well as adequate drainage structures with bridges a full two lanes. Roads constructed to these standards will require less in terms of major maintenance efforts than would a B-2 classified road.

The construction of these roads will be coordinated by USAID and Travaux Publics with the proposed OMVS Mali Roads Project to be centered around Kayes. Procurement of equipment and training of personnel are to take place simultaneously. It is also expected that the technical assistance provided under the proposed OMVS project will be utilized in this project as well.

Project specific, task oriented equipment is to be purchased for the construction of the roads. It is to be recommended to Travaux Publics that necessary equipment for road maintenance be maintained in the Cercle with sufficient crew for operation and maintenance. That equipment which remains will be pooled with the equipment purchased under the OMVS Mali Roads Project and maintained at the Kayes regional maintenance center. The equipment to be purchased will include heavy earthmoving equipment with support items and equipment for the construction of concrete drainage structures. Estimated cost is $ 1.1 million as follows :

(see page 13)

RECOMMENDED HEAVY EQUIPMENT LIST FOR ROAD CONSTRUCTION

	Est. Unit Cost	Total Cost
2 Bulldozers	US$ 90,000	US$ 180,000
2 Wheeled scrapers	80,000	160,000
1 Compactor	85,000	85,000
1 Disc, Rome	20,000	20,000
2 Motorgraders	70,000	140,000
2 Water Trucks (5000 liters cap.)	30,000	60,000
2 Fuel Tanks (2000 liters cap.)	2,500	5,000
1 Truck tractor with heavy duty winch and equipment semitrailer (low-bed type) 50 tons cap.	50,000	50,000
1 Pick-up truck 3/4 ton cap. with utility bed equipped with 300 amp electric welders, oxy-ace welding and cutting torch, air compressor and complete set of mechanic hand tools (4 wheel drive)	20,000	20,000
1 Pick-up truck, 1/2 ton cap., 4 wheel drive for supervisor	12,000	12,000
2 Dump trucks (4m^3 cap.)	17,500	35,000
2 Water pumps (4 inch diameter intake)	5,000	5,000
1 Wheel loader	45,000	45,000
		$ 817,000
	15% inflation & contingencies	122,500
	20% spare parts	163,500
	US$	1,103,000

RECOMMENDED EQUIPMENT LIST
FOR CONCRETE DRAINAGE STRUCTURES

	Est. Unit Cost	Total Cost
1 Concrete mixer (165 cap.)	US$ 12,000	US$ 12,000
1 Electric Generator (3 KW), 220 Volt, 50 cycle	5,000	5,000
2 Concrete vibrators (motor in head type) two meters lead lead hose, 16m heavy duty electric cord	1,500	3,000
15 Wheelbarrows	50	750
2 Water tanks (2000 liter cap.)	2,500	5,000
		US$ 25,750
	15% inflation & contingencies	3,900
	20% spare-parts	5,150
		US$ 34,800
		say $ 35,000
Total for all equipment		$ 1,138,000

Other costs for the construction of the road are estimated at approximately $ 1.5 million dollars. This includes earth-moving costs at approximately $ 9,000 per kilometer and 40 drainage structures at an average cost for materials and construction of $ 15,000 each. These figures may have to be revised and refined at the time of the Project Paper as it

was unfortunate that an engineer was not able to accompany the PRP team to survey the project area. Total cost for the road component equals an estimated $ 2,638,000.

2. Agricultural Component

As stated earlier in this paper, the Government of Mali is seeking to establish food production self-sufficiency in the shortest possible time. At the end of the drought years of 1970-74, it was concluded that grain production would lead to faster recovery than any other crops. Consequently, the GOM has centered its agricultural efforts in the production of cereals crops in all regions of Mali. The proposed project is aimed at introducing new technology to farmers in one of the most remote areas of Mali. It is the opinion of the GOM and donor agencies that intervention in areas such as that proposed herein quite often create a multiplier effect in adjacent areas.

The highest priority in the Ministry of Rural Development is to increase production and stimulate internal commercialization of cereals such as sorghum, millet, corn and rice. Groundnut production was recently introduced to the project area by "Operation Arachide". This recent intervention by an operation has begun to gain some momentum in a cash crop regime. While it is hoped that this intervention will improve and stimulate the economy of the area, it is not expected to improve overall cereals production without assistance. Therefore, assistance for agricultural development (cereals production as well as others) will be channeled through this agency already experienced in the area.

Though the agriculture sector occupies the efforts of 98 percent of the population in the Keniéba cercle, the production of food crops has been less than adequate. It will remain so without organized

activities for change. The changes inherent to this project, along with necessary inputs, should permit the area to become self-sufficient in providing an adequate diet for its population as well as contributing to the goal of the GOM to make Mali as a whole self-sufficient in cereals production. The area is now estimated to produce average yields per hectare in grains of a low 300 kilograms to a high 600 kilograms. Production below 700 kilograms per hectare is considered non-productive in other parts of Mali. The project area, with its high rainfall of 1200-1300 millimeters annually, has conditions favorable for much higher yields than currently observed. With proper assistance, and adequate inputs, it is estimated that the farmers in the area could produce more than 2 tons per hectare of pluvial rice and probably up to 2 tons per hectare of millet. Conditions are also favorable for high yields of corn and sorghum.

Though "Operation Arachide" (OACV) was formed to encourage and continues to have for its primary function, the production and marketing of groundnuts, they have added to their mandate "cultures vivrières", or various other crops. As part of this, they wish to respond to the needs of the area in the Keniéba cercle to increase production in cereal crops. This production will be both for autoconsumption (recognized by OACV officials as a need) and eventually for marketing to other areas of Mali. First Region Operation Arachide officials are very interested in the possibilities of an extensive rainfed rice cultivation on the 700 hectare plain of Moussala along the Falémé River. It is recognized, however, that they are not presently equipped to exploit this very fertile plain

and it is to this lack that a large measure of this project is addressed.

Rice is still considered to be in many respects a prestigious crop in much of Mali. In the area if the Keniéba cercle it could very well become a major part of the main diet, just as it is across the nearby frontier in Guinea. This area of Guinea has for years concentrated on "Riz pluvial" or rainfed rice as the main crop. The conditions and soils around Moussala, the plain and along the river are the same as they are in nearby Guinea.

Up to the present time, no improved seeds nor technological packages have been tested or distributed in the project area. However, it is believed that varieties of rice can be selected which will prove to be high yielding when coupled with other agricultural inputs. By the end of the project it should be possible to show a dramatic increase in the production of rice. If production of 750-1000 kilograms per hectare can be achieved, the plain of Moussala would be able to provide for the entire cercle of Keniéba and still have enough to market in other areas.

The main concern of the project will therefore be to increase and improve rice production on the 700 hectares of the plain of Moussala along the banks of the Falémé River. At the same time, other crops will not be ignored. An estimated 700-1000 hectares of untilled land is available in the project area for growing other cereal crops if the farmers are given the necessary assistance and technological packages. Crops of which it is believed increased yields can be obtained are corn, millet and sorghum. These are traditional crops in the area which have been providing the farmers and their families a bare subsistence.

Though small in terms of total area and probable cost, the project also wishes to introduce up to 200 hectares of vegetable production in and around the villages of the project area. One major vegetable crop is to be tomatoes to address an observed nutrition deficiency of vitamin C (see health component). Other vegetable crops can be introduced and an increase in such root crops as cassava, yams and potatoes. Vegetable production will be primarily for autoconsumption though there will be, no doubt, some marketing of such production.

When the Project Paper is developed, the team is to look into the possibilities of introducing citrus fruit production to the area. Fari, in the most isolated and difficult area of the cercle of Keniéba to reach, has considerable production of oranges. The PP team should look into the possibilities of transplanting trees from that area to the proposed project area for the establishment of citrus groves.

To achieve the outputs envisioned above, a technological package is to be developed and introduced to the area under the auspices of Operation Arachide. Already, some of the practices of this package have been introduced by Operation Arachide in its attempts to increase groundnuts production in the area. This package to be introduced and expanded will include the following : (1) plowing in line; (2) larger plant population; (3) improved seeds; (4) weed control; (5) use of fungicides for seed treatment; (6) use of manure and compost for natural fertilizer; (7) use of chemical fertilizers; (8) rotation of groundnuts with other cereal crops (a practice already adopted and encouraged by Operation Arachide); (9) equipment and utensils necessary to expand hectarage under

cultivation and facilitate setting production to processing and collection centers and markets.

It is expected that, by working through Operation Arachide, a credit mechanism for the necessary inputs can be worked out based on the Operations own experience. This involves an in-kind repayment for the inputs. This credit arrangement will require more study at the time of the PP and the exact mechanisms worked out with Operation Arachide et Cultures Vivrières.

The project will require training, including observational visits to third countries for extension agents working in rainfed rice production. This is very important in-as-much as irrigated rice has been rejected for the moment as too costly and too difficult to implement. Once the OMVS program for development of the Senegal River and its tributaries is well underway, irrigated rice should be considered a distinct possibility.

Other training will involve the farmers in breaking oxen to the yoke. This can be done in Mali which probably has the most extensive use of animal traction in West Africa. The project also envisages follow-up technical assistance to see that the farmers are not only properly following animal techniques learned, but that they are properly caring for their animals. Since animal traction has already been introduced to the area by Operation Arachide, and there are cattle available for some animal traction, these pull animal units will be in addition to those provided for under the cattle component described below.

One final component to the agricultural part of this project will include provision for a cercle storage unit and a series of village

storage as being the primary cause for the loss of major proportions of the crops they now grow. The village storage units will be utilized primarily for crops grown for auto-consumption, while the cercle storage unit will be for marketable crops and the beginning of establishing a reserve for emergency situations.

Operation Arachide will be responsible for managing the cercle storage unit and advising the farmers on proper storage of grains in the village units. As an adjunct to the market storage at Keniéba, a truck is to be provided to Operation Arachide to assure timely evacuation of marketable crops, in this case primarily rice.

Agriculture Component Budget
(U.S. Dollars)

2	All Terrain Vehicles	24,000
10	Mobylettes	5,000
	Spare parts	5,800
100	Plows	7,500
100	Multicultivators	10,000
100	Carts	10,000
	Insecticides and Fungicides	19,000
	Rodent Control	7,500
	Seeds	12,000
	Fertilizers	40,000
	Training and Technical Assistance	35,000
	Operating Support	55,000
	T O T A L :	$ 230,000

1	Heavy duty truck for marketing	20,000
10	Village storage units	50,000
1	Cercle storage unit	40,000
	Truck Spare Parts	4,000
	T O T A L :	$ 114,000
	Total Budget :	$ 344,800
	15% Inflation and Contingencies :	$ 51,700
	T O T A L :	$ 396,500

3. Livestock Cattle Component

As was previously stated, the livestock common to the project area are all of a trypanotolerant ecological type. The latest estimate of livestock numbers in the Keniéba Cercle by sectors is as follows :

Arrondissements	Bovines	Sheep	Goats
1. Kassoma	3,000	2,500	1,500
2. Dombia	2,500	2,500	1,000
3. Central (Keniéba)	3,500	3,000	1,500
4. DialaFara	3,500	3,000	1,500
5. Falea	5,000	4,500	2,000
6. Faraba	8,500	7,000	3,500
T O T A L :	26,000	22,500	11,000

Present management practices for cattle include night penning (usually bamboo enclosures) and day herding by hired Fulani herders. The use of cattle for farm traction is known but little used since most farming is subsistence oriented. However, Operation Arachide has made a good start in introducing animal traction to the area. Opportunities certainly exist for expanding cattle holdings of farmers directed at their use in farm traction, supplying milk for auto-consumption, beef for home consumption and live cattle for

breeding and outside slaughter. Marketing of surplus cattle does not appear to pose a problem in terms of a constraint to increased production in the project area.

A. Production Characteristics of N'Dama Cattle

Cattle are judged to be the animal par excellence in the project area. The small ruminants -- sheep and goats -- offer no development possibilities. The climate is ill-suited to sheep due to their susceptibility to parasitism and pneumonic diseases. Goats are too difficult to control during the season of growing crops. However, any program of animal health must, of necessity, include small ruminants for major killing diseases since they often are subject to the same maladies as cattle.

N'Dama type cattle are believed to have originated in cattle accompanying Berber migrants from southern Morroco. The Fouta Djallon Plateau in Guinea is regarded as being the point of origin in West Africa from where the N'Dama has spread to surrounding countries.

The N'Dama (or small cattle) is the only bovine found in the project area. They are humpless and trypanotolerant. They stand 100-110 centimeters at the withers with mature females weighing some 225-275 kilograms. The tail is long with a well-developed switch which offers considerable protection from biting flies. The most common and prototypical color is tan or russet, often with darker shading along the top and

bottom lines. The dewlap and umbilical fold are not accentuated. Full black and white colors can be seen but are the exception.

First breeding of heifers is at three years and cows tend to breed for 10 years. Under reasonable levels of nutrition, calves may be dropped throughout the year, but occur most often in the late rains. The milk yield is low and should to all good advantage, be allowed to the calf. However, it is sufficient to permit a low level of milking for auto-consumption. The calving rate exceeds 60 percent on the average. N'Dama Oxen, starting at 3 to 4 years of age, are well suited to farm traction. They will be subject to breaking down from trypanosomiasis with over-work and lack of adequate nutrition as would be the case with all cattle.

Table 1 through 5 demonstrate potential production models and herd projection for N'Dama in the project area. With only a modicum of improved care and management, the breed is capable of providing a 12 to 14 percent offtake and an annual herd increase of 6 to 8 percent (see Table 5).

B. Major Constraints to Production

Apart from constraints in the five phases of production, mention must also be made of other problems. The first pertains to the rather low esteem held by many concerning the N'Dama itself. Such concern is judged to be unfounded when comparing the N'Dama in its fly habitat with the northern

Zébu in the Sahel. That is, the calf drop is normally higher for the N'Dama, which also reaches market age and weight sooner. The end result is that per unit of land area, the N'Dama is much more productive than the Zébu. More importantly, there is no alternative to trypanotolerance in the project area.

Another problem is the relatively limited number of N'Dama available for development in this area. Thirdly, predatory felines pose somewhat of a constraint to cattle production in the Keniéba, although this is manageable by local village hunters.

The order of constraints in the production phases are by nature dynamic and ever changing. For cattle in the project area, the order changes between the dry season and the rainy season in several instances. For example, during the rains, management becomes an overriding issue where Fulani herders are not employed, whereas nutrition in the form of stock water and good pasturage becomes a major constraint at the height of the rainy season. Also, animal health, other than major killing diseases, is usually more of a problem during the rainy season. The following order of major constraints are judged to apply under base-line conditions in the two seasons for cattle:

Order	Dry Season	Rainy Season
1	Nutrition	Management
2	Management	Health
3	Health	Nutrition
4	Breeding	Breeding
5	Marketing	Marketing

The rationale for the above order and a brief elaboration thereon is as follows:

Nutrition , which covers the sum total of feed and water intake or nutritive requirements, is the chief constraint during the dry season resulting from much of the grass cover being burned over and drying up of most surface water. The only practical solution is to move cattle to perennial streams, normally within a maximum of 20 to 30 kilometers, and possible if Fulani herders are employed. In the rainy season, nutrition is much less of a constraint but still significant where professional herding is not used. This is because cattle by themselves will laze around the village and not move from the village to seek out good grazing. The taking of excessive milk, thereby starving the calves, does not appear to be a problem.

Management, or husbandry, denotes the day to day care of project cattle, and under the present production system overlaps nutrition. Good Fulani herders handle this phase in a commendable manner when left to their own devices.

However they are often hampered in getting cattle out to pasture by owner's delays in milking the cows. This means that instead of 8 to 12 hours of grazing, many herds are only allowed 5 to 7 hours daily. The remainder of the day is spent in close quarters with extreme fly worry.

Health, includes all aspects of disease control and prevention. While periodic vaccination can take care of major killing diseases (i.e., rinderpest, blackleg, contagious bovine pleuropneumonia and anthrax), outbreaks have been occuring among project area cattle because the local veterinary service lacks the wherewithal to deliver needed health measures other than vaccination support. It is also noteworthy that close proximity to unvaccinated herds in Guinea and Senegal leaves project area herds subject to reinfection. Although ticks are found in the area, they pose a problem for only a brief period of time near the end of the rainy season. It is not envisaged that dipping would be worthwhile in the case of adult cattle, however spraying would be effective. Calves could be kept free of ticks by hand spray methods.

Breeding, refers to the genetic make-up of the N'Dama cattle under consideration, their suitability to existing environmental conditions, judged ability to respond favorably

to better production practices, and the extent to which it is desirable or even readily possible to change their basic genotype. It can be categorically stated that the N'Dama breed is extremely well suited to the needs of the project area's inhabitants. They are excellent draft and beef animals with the cows giving adequate milk for the calves including limited milk for home consumption. Their overall size may leave something to be desired, but it should be possible to make reasonable improvement through a measure of selection on the male side coupled with castration of all surplus bulls, along with adequate feeding.

Marketing, in the present instance concerns disposal of herd off-take. The shortage of oxen for farm traction, cattle for slaughter in the First Region and a strong demand for trypanotolerant breeding animals bodes well for cattle expansion in the project area. Without doubt, marketing will not be a major constraint in production, the remoteness of the area notwithstanding.

C. Cattle Development Plan

The plan for improving cattle production in the project area involves both a package of improved production practices to remove constraints in the production phases, and special provisions to widen the distribution of cattle among

sedentary Malinké agriculturalists. Because the implementing agency is concerned with increased agricultural production, the cattle component can be considered to essentially represent another "crop" in an integrated agricultural development program.

The main focus will be first and foremost to providing oxen for farm traction, and secondarily to converting grass to badly needed products in the form of milk and meat. The target area is five villages south and west of Keniéba with Fehola and Moussala being the most southerly.

Efforts to broaden the distribution and increase the total number of cattle will hinge upon a loan with repayment in kind arrangement. Farmers will be provided with an N'Dama unit of one bull and 15 cows (two work oxen replacing a like number of cows if desired). It is expected that within five years a like number of animals would be returned to the implementing agency for loan to other interested participants. It is envisaged that six N'Dama units will be placed in each of the five target villages, making a total of 30 units involving 480 head of cattle.

Participant farmers within a given village will be expected to combine their cattle into a village herd to be cared for by a hired Fulani herder. They will also be expected to build a traditional bamboo corral, for night

penning, with the addition of a simple crush for restraining animals during routine vaccinations by the veterinary service.

The Cercle veterinary staff and the livestock technician assigned to the implementing agency must provide participating farmers with a complete package of production practices that is to include guidance in preparing pit silos for feeding draft oxen, general herd management supervision, castration of surplus males, selection of breeding bulls, routine vaccination, and disposal of marketable animals. To assure that the area veterinary staff can provide the needed disease control program, it will be necessary that the project upgrade the Keniéba veterinary service, providing it with the wherewithal to deliver a program other than vaccination support.

Tables 1 to 5 demonstrate the projection of the original 480 head of N'Dama cattle over a five year span. These tables clearly show that repayment in kind is possible within the projected five year period. The total budget is estimated at $ 126,000, excluding recurrent costs, which should be minimal (see table 6).

TABLE I

N'DAMA HERD PROJECTIONS - YEAR 1
(Numbers & Percent)

	Herd Composition	Mortality	INVENTORY FLOW - YEAR 1					
			Opening Inventory	Addition due to births	Outright losses	Herd Offtake	Closing Balance	% of Herd
FEMALES	Brood Cows	6	420	0	25	10	385	62.1
	0-1 year	25	0	130	32	5	93	15.0
	1-2 years	8	0	0	0	0	0	0.0
	2-3 years	5	0	0	0	0	0	0.0
Sub-Total			420	130	57	15	478	77.1
MALES	Stud Bulls	5	30	0	1	1	28	4.5
	0-1 year	25	0	130	32	10	88	14.2
	1-2 years	8	0	0	0	0	0	0.0
	2-3 years	5	0	0	0	0	0	0.0
	3-4 years	4	15	0	1	1	13	2.1
	over 4 yrs.	4	15	0	1	1	13	2.1
Sub-Total			60	130	35	13	142	22.9
T O T A L			480	260	92	28	620	100.0

Production Coefficients:

1. Bull to cow ration : 1 to 14
2. Calf Drop : 62%
3. Effective Calving Rate: 46%
4. Cow replacement Rate: -8.3%
5. Bull replacement rate: -6.7%
6. Age at first breeding: 3 years
7. Herd offtake : 5.1%
8. Herd increase : 29.2%
9. Herd offtake plus herd increase: +34.3%
10. Total herd mortality : 16.7%

TABLE 2 : N'DAMA HERD PROJECTIONS - YEAR 2
(Numbers & Percent)

	Herd Composition	Mortality	INVENTORY FLOW - YEAR 2 Opening Inventory	Addition due to births	Outright losses	Herd Offtake	Closing Balance	% of Herd
FEMALES	Brood cows	6	385	0	23	5	357	49.1
	0-1 year	25	0	119	30	5	84	11.3
	1-2 years	8	93	0	5	0	88	12.1
	2-3 years	5	0	0	0	0	0	0.0
Sub-Total			478	119	58	10	529	72.5
MALES	Stud Bulls	5	28	0	1	1	26	3.6
	0-1 year	25	0	119	30	10	79	10.9
	1-2 years	8	88	0	7	10	71	9.8
	2-3 years	5	0	0	0	0	0	0.0
	3-4 years	4	0	0	0	0	0	0.0
	Over 4 years	4	26	0	1	2	23	3.2
Sub-Total			142	119	34	23	119	27.5
T O T A L			620	238	97	33	728	100.0

Production Coefficients:

1. Bull to cow ratio: 1 to 4
2. Calf Drop : 62%
3. Effective calving rate : 46%
4. Cow replacement rate : -7.3%
5. Bull replacement rate: -7.1%
6. Age at first breeding: 3 years
7. Herd Offtake : 4.9%
8. Herd Increase: +17.4%
9. Herd offtake plus herd increase : +22.3%
10. Total herd mortality : 14.4%

TABLE 3 : N'DAMA HERD PROJECTIONS - YEAR 3
(Numbers & Percent)

	Herd Composition	Mortality	INVENTORY FLOW - YEAR 3 Opening Inventory	Addition due to births	Outright losses	Herd Offtake	Closing Balance	% of Herd
FEMALES	Brood cows	6	357	0	21	5	331	40.5
	0-1 year	24	0	112	27	5	80	9.8
	1-2 years	7	84	0	6	0	78	9.5
	2-3 years	4	88	0	4	0	84	10.3
Sub-Total			529	112	58	10	573	70.1
MALES	Stud Bulls	4	26	0	1	1	24	3.0
	0-1 year	24	0	112	27	10	75	9.2
	1-2 years	7	79	0	6	10	63	7.7
	2-3 years	4	71	0	3	6	62	7.6
	3-4 years	4	0	0	0	0	0	0
	Over 4 years	4	23	0	1	2	20	2.4
Sub-Total			199	112	38	29	244	29.9
T O T A L			728	224	96	39	817	100.0

Production Coeffficients:

1. Bull to cow ratio : 1 to 4
2. Calf Drop : 63%
3. Effective calving rate : 47%
4. Cow replacement rate : -7.3%
5. Bull replacement rate: -7.7%
6. Age at first breeding : 3 years
7. Herd Offtake : 5.1%
8. Herd Increase : +12.2%
9. Herd Offtake plus herd increase : +17.3%
10. Total herd mortality: 12.4%

TABLE 4 : N'DAMA HERD PROJECTIONS - YEAR 4
(Numbers & Percent)

	Herd Composition	Mortality	INVENTORY FLOW - YEAR 4 Opening Inventory	Addition due to births	Outright losses	Herd Offtake	Closing Balance	% of Herd
FEMALES	Brood cows	5	415	0	21	42	352	40.8
	0-1 year	23	0	133	31	5	97	11.3
	1-2 years	6	80	0	5	0	75	8.7
	2-3 years	4	78	0	3	2	73	8.5
Sub-Total			573	133	60	49	597	69.3
MALES	Stud Bulls	4	38	0	2	4	32	3.7
	0-1 year	23	0	133	31	10	92	10.7
	1-2 years	6	75	0	5	10	60	7.0
	2-3 years	4	63	0	3	15	45	5.2
	3-4 years	4	48	0	2	20	26	3.0
	over 4 years	4	20	0	1	9	10	1.1
Sub-Total			24	133	44	68	265	30.7
T O T A L			817	266	104	117	862	100.0

Production Coefficients :

1. Bull to cow ratio : 1 to 11
2. Calf Drop: 64%
3. Effective calving rate : 49%
4. Cow replacement rate : 15%
5. Bull replacement rate : 15%
6. Age at first breeding : 3 years
7. Herd Offtake : 13.9%
8. Herd increase : 5.5%
9. Herd offtake plus herd increase : 19.4%
10. Total herd mortality : 12.4%

TABLE 5 :

N'DAMA HERD PROJECTIONS - YEAR 5
(Numbers & Percent)

	Herd Composition	Mortality	INVENTORY FLOW - YEAR 5					
			Opening Inventory	Addition due to births	Outright losses	Herd Offtake	Closing Balance	% of Herd
FEMALES	Brood cows	5	425	0	21	42	362	39.4
	0-1 year	22	0	138	30	5	103	11.2
	1-2 years	5	97	0	5	2	90	9.8
	2-3 years	4	75	0	3	2	70	7.6
Sub-Total			597	138	59	51	625	68.0
MALES	Stud Bulls	4	35	0	1	4	30	3.3
	0-1 year	22	0	138	30	10	98	10.6
	1-2 years	5	92	0	5	10	77	8.4
	2-3 years	4	60	0	2	20	38	4.1
	3-4 years	4	45	0	2	15	28	3.1
	over 4 years	4	33	0	1	10	22	2.4
Sub-Total			265	138	41	69	293	32.0
T O T A L			862	276	100	120	918	100.0

Production Coefficient :

1. Bull to cow ratio : 1 to 12
2. Calf drop : 65%
3. Effective Calving rate : 51%
4. Cow replacement rate : 15%
5. Bull replacement rate: 15%
6. Age at first breeding : 3 years
7. Herd offtake: 13.5%
8. Herd increase : 6.5%
9. Herd offtake plus herd increase : 20%
10. Total herd mortality : 11.2%

TABLE 6:

CATTLE COMPONENT BUDGET
(U.S. Dollars)

A. Herd Development

1. N'Dama Unit - 16 head composed of:

1 Bull

15 Cows or 13 cows and 2 oxen

Average price per head ₲ 120, or a total of ₲ 1,920 per unit.

2. Five villages receiving 6 N'Dama units = 30 units total or 480 head of cattle at a cost of ₲ 57,600

B. Farm Implements - 1 set

1) Plough	₲ 50,00
2) Multicultivator	₲ 110.00
3) Seeder	65.00
4) Sprayer	35.00
5) Cart	100.00
TOTAL 1 set	₲ 360.00 x 30 = ₲ 10,800

C. Upgrading Cercle Veterinary Service

1) All-terrain vehicle	₲ 12,000
2) 3 Mobylettes	1,500
3) Spare Parts	2,700
4) Veterinary equipment and supplies:	
a) 2 kerosene refrigerators	1,500
b) 3 emasculators (Burdizzos)	150
c) Syringues, needles, etc. - 1 lot	1,000
5) Vaccines - 100,000 does	12,000
TOTAL	₲ 30,850

D. Pit Silo Construction - ₲ 10,000

TOTAL	₲ 109,250
15% Inflation & Contingencies	₲ 16,388
	₲ 125,638 Say ₲ 126,000

4. Health Component

The circumstances of the inhabitants of the Cercle of Keniéba typify the situation in general for the residents of the First Region: isolation, safe-water scarcity, inadequate food storage facilities and the abundance of human disease vectors, all contributing to a low quality of life. These circumstances, however, have not been totally without some advantages to health. Inward and outward migration has been minimized, resulting in a stable population for the cercle with a respectable density of 5 people per square kilometer. The depth of the water table has increased the dependence of the population on deep well water which is safer from contamination. The spectrum of disease problems has attracted expatriate medical assistance which augments and complements the government sponsored health facilities. The lack of a ready outside market has discouraged overconcentration on cash crops and resulted in more food for auto-consumption.

Despite these seeming "advantages", the area is depressed though with a very recognizable potential for development. Operation Arachide, through a program of subsidy and self-help is promoting the growing of groundnuts as a cash crop.

USAID, through the project outlined in this paper is proposing to improve road communication, initiate the expansion of rain-fed agriculture and promote the development of a cattle

industry by increasing the herd of N'Dama cattle through a repayment-in-kind system.

It would be difficult, if not pointless to consider these programs in isolation, for their problems as well as their benefits are part and parcel of integrated rural development. The time frame of each development will influence the nature and extent of the impacts. At this point in time, however, it would be difficult to predict their likely sequence.

There are a variety of health related concerns which can readily be identified in the Cercle of Kenieba - indeed for the First Region generally.

Onchocerchiasis - Moussala near the Falémé River has a 10 percent prevalence of blindness due to Oncho and Trachoma. The ages of blind individuals extend into the teens indicating an extreme intensity of transmission. The Kenieba clinic treated 251 cases in 1975. The effects are severe irreversible debility and most often affect fishermen, herders, hunters and farmers.

Infant Mortality - Estimated by clinic workers to be as much as 80 percent before age 5. Many parts of West Africa are considered to have infant mortality rates of 50 percent, but lack of statistics produces a large degree of uncertainty. Major causes are due to weaning, diarrhea, malaria, measles, tetanus and influenza.

Scurvey - While not a significant cause of mortality, this rather common deficiency could easily be eliminated by the introduction of citrus fruits or other crops with high vitamin C content, such as tomatoes.

Trachoma - A second significant cause of blindness in the area. It must be differentiated from Onchocerchiasis for treatment. The Interdenominational clinic at Keniéba has a staff of Malians trained to perform nodulectomies for Oncho and the Jasch-Arlt eye-lid operation for Trachoma.

Urinary Schistosomiasis - This is a significant cause of morbidity to school age children in the area (912 cases treated in 1975) with possible implications to genito-urinary problems in later life.

Intestinal Schistosomiasis - An unknown quantity in the Keniéba cercle, it is known to be spotty in distribution in Africa. It is most common among fishermen and is generally considered to have greater potential for morbidity and even mortality where it is present.

Hepatitis - This primary indicator of water quality deterioration is sometimes a precursor of typhoid and cholera outbreaks. It is particularly common in the high-lands to the northeast of Keniéba. Here, the primary concern is to eliminate contaminated water supplies.

Trypanosomiasis - This is related to Tse-tse fly density. The low number of cases of sleeping sickness treated at the clinic (2) probably belies the real prevalence of infection, as somnambulance is symptomatic of long-standing infection. Early symptoms are recognizable and warrant treatment when found.

Malaria - Is halvoendemic for the area. Presently receives the lion's share of medical attention through clinic treatment (7,832 cases in 1975) and the Nivaquinization program of the GOM.

Water Shortage - The town of Kenieba is essentially without water for three months of the year (April, May, June) when all wells are dry. When the wells go dry, water is obtained from storage containers filled earlier from the wells. The government maintains a tank truck; with a capacity of 6000 liters, which makes two trips per day to the Falémé to supplement the stored water. This trucked in water accounts for 2.4 liters per person per day for the town inhabitants. This is well below water quantity standards set by the World Health Organization.

Grain Storage - In past years, supplementary grain, supplied from international sources, has been of limited use due to a lack of adequate community storage facilities.

This list is probably by no means complete, but it is representative of the concerns of the health community in the Cercle of Keniéba.

As was previously pointed out, the health facilities in the Cercle of Keniéba are modest for an area with 85,000 inhabitants, but those in charge appear to be hard working health professionals. The problem is that they are capable of delivering adequate service only to those who are able to reach the health facility. Their services do not extend beyond the walls of the health community, and it is likely that less than 10 percent of the Cercle residents receive any services at all from the 11 facilities within the Cercle.

The various programs proposed for the economic development of the First Region have potential for changing traditional behavioral patterns of the inhabitants which could in turn have additional consequences with regard to health. Some of these predicted changes are discussed below:

A. Increased Emphasis on Production of Cash Crops.

1. Positive considerations :

The availability of cash will increase the ability of residents to pay for medicines and medical services. This should in turn positively influence the availability of commercially marketed drugs which are now often in short supply.

Similarly, the availability of cash would extend the ability of farmers to supplement their family diets with a variety of nutritious foods, including meats and fruits. There is, for example, evidence of a vitamin C deficiency among the children of Kenieba Cercle at present. This could be offset by the availability of citrus fruits or other foods high in vitamin C content. Other commodities available for cash that would lead to increased health include insecticides for home use, well casings and community sanitation facilities.

2. Negative Considerations :

At present, there are no overt signs of serious protein-calorie deficiency among the Cercle residents. If increased emphasis on cash crops is achieved at the expense of subsistence crops, possibilities would exist for nutritional deficiencies, particularly in the eventuality of a falling cash crop market, or the failure of the cash crop itself.

B. Increased Mobility of Populations.

1. Positive Considerations :

Improved roads will greatly facilitate emergency evacuations which at times must be accomplished by the plane and pilot of the Interdenominational Mission located in Kenieba. Less serious cases requiring surgical attention will have access to the Regional Hospital at Kayes. Conversely, the personnel and materials required to launch much needed vector control programs against Simulium sp. (Onchocerchiasis vector) and

Tse-tse flies (sleeping sickness vectors) would be facilitated as well as the periodic immunization programs of OCCGE and the Livestock Services.

2. Negative Considerations :

Increased population mobility carries with it an increased risk of importing susceptible, non-immune individuals into an area that is highly endemic for Onchocerchiasis, Trypanosomiasis, malaria and Schistosomiasis. Without significant, previous exposure to these infections, newcomers could possibly be exposed to a greater risk of serious infection than would the long-term resident.

Additionally, increased population density, particularly at "urban" centers promotes the risk of communicable diseases such as influenza, diarrheal infections, infant desease. There is also a risk of overloading the existing health care delivery systems, water supply and sanitation facilities.

C. Increased Emphasis on Livestock Production.

1. Positive Considerations.

There is little need to belabor the point of increased benefits with regard to the improved nutrition that results from increased consumption of animal protein. That the livestock can be maintained on grassland unsuitable for subsistence cropping is a definite advantage. The proposed program will require an insignificant amount of human immigration, thereby minimizing the factors emphasized above.

2. Negative Considerations.

Aside from the possibility of increased risk of vector borne diseases such as Onchocerciasis and Trypanosomiasis to a relatively small number of herders, health risks to the community are in direct proportion to the distance of the herd from the village. (The risks to the herders can be minimized through a program of regular examinations and treatment where necessary).

Flies such as Stomoxys sp. that breed in livestock feces can be significant pests. Similarly cattle flesh flies of the genus Dermatobium are the cause of human myiasis. The contamination of village water supplies by cow feces is also believed to be a cause of botulism.

Finally, a small but significant number of predator species are reported by villagers to be in the area. No human fatalities have been attributed to the cats, but the villagers cited them as the cause of livestock deaths. It is not clear that an additional livestock component would attract such predators, but the possibility should be examined.

The two major components of the development project for the project area have been outlined in previous sections. Similarly, the existing Public Health problems and available resources have been summarized and itemized. The priorities for improving the health status of the Kenieba Cercle residents,

as well as those for minimizing the negative impacts of development may be summarized as follows:

1. An assured supply of safe water should be a primary concern and goal. This, not only for the inhabitants of the town of Kenieba, but for the entire Cercle. Considering the present methods of storage, it is surprising that severe water-borne epidemics of cholera, typhoid and/or hepatitis have not occurred. To fulfil this objective it will probably be necessary to mechanically drill for water as many of the existing wells that are in excess of 60 meters go dry. An hydrologist and/or water resources engineer should examine the possibility of pump assisted water delivery, supplemented by community water storage standpipes.

2. Grain storage facilities in the area have failed to allow sufficient use of the available supplies. Technical assistance should be employed to devise an appropriate solution to this important nutritional problem. Rodents ?

3. The nutritional status of First Region residents is not clear. Overt signs of vitamin C deficiency can be seen in the Kenieba area, but other, more insidious, nutritional problems may exist. A cercle-wide nutritional/health survey would prove very useful to determine what the nutritional needs might be. Alternatively, a list of indigenously cultivable

crops should be compiled that would represent adequate supplements for all perceived deficiencies. This should particularly include citrus fruits.

4. The high prevalence of blidness among Keniéba area residents, particularly among younger inhabitants, highlights the need for an intensive black fly eradication program. The activities of the WHO program for that area should be evaluated by a trained entomologist. It is possible that a degree of control has been achieved and that the high prevalence of onchocerchiasis reflects only pre-existing infection. Vector control however may not save the sight of those now infected. They should be identified and treated.

5. Tse-tse fly breeding areas constitute only about 10 percent of Mali's ground surface area. Experts in the field are convinced that an eradicaction scheme for the First Region is tenable. The relatively low prevalence of sleeping sickness may only be the tip of the iceberg with regard to trypanosomiasis, which can exist in individuals in a symptomatic state. An eradication program for Tse-tse would also have obvious carry-over into the area of livestock health.

6. At present, the services of the eleven clinics and dispensaries of the Keniéba Cercle are being used by only a fraction of its residents. Recognition of this fact has prompted suggestions that the area be included in at least two

proposed programs devoted to village rural health delivery. Because the project area is isolated from support for 3-4 months of the year by impossible roads, both of the programs cited required the establishing of a village oriented infrastructure which would be difficult to maintain among the 200 widely separated villages.

7. Finally, some of the health problems, particularly Onchocerchiasis are in need of immediate attention. Once road building activities have brought the Kenieba Cercle within the reach of full-time logistical support, village oriented health care of the type proposed will undoubtedly be an appropriate step.

It is recognized the all of the major problems summarized above cannot be addressed by the program herein proposed. However, in keeping with the concept of integrated rural development, it is proposed to devise an outreach program for inclusion within the First Region Integrated Rural Development Plan. This program is to be attached to the existing clinic and maternity services in the town of Kenieba, but to be separetaly staffed, with equipment provided by the development project. In all medical matters, the outreach staff will answer to the Medecin Chef du Cercle de Kenieba, but the population to be served will be the concern of the outreach staff team leader.

At present, two types of agriculturally related development schemes are being proposed for the Keniéba area: (1) An extension of rainfed agriculture presently practiced on the plain of Moussala adjacent to the Falémé River; and (2) The introduction (and expansion) of village herds of N'Dama cattle into the grasslands to the south and west of the town of Keniéba. The purpose of the outreach program is to offset any risks to health brought about by the development project itself, while providing a fundamental rural health service for the inhabitants of the arrondissement in which the development takes place.

In concept, the Public Health Outreach unit is to consist of three paramedical workers and one driver touring throughout the central arrondissement of Keniéba Cercle. The Paramedical Team, operating from an all terrain vehicle, should consist of one Infirmier d'Etat, one Agent de Santé Publique and one PMI-Midwife-Matron. For counsel and direction with regard to health matters, they would be guided by their Keniéba based counterpart within the Service de la Santé, the Medecin Chef and the Directeur du Bureau des Grandes Endemies. Initial supplies, however, are to be provided by the development project in order not to drain the supplies from the Keniéba facility.

Following established routes, the team is to visit systematically as many remote villages within the arrondissement as is practicable. The length of time for the team to remain in a village will, of necessity, depend upon the population size and the need for services. Initial visits will require more time, but this should be reduced as the team establishes a routine. Duties of the team are to be divided according to their area of competence:

Infirmier d'Etat : Dispensing of medicines; treatment of skin ulcers and wounds; diagnosis and evaluation of endemic diseases and referral.

Agent de la Santé Publique : Recording of statistics, inspection of water supplies; census of vector densities; reporting of chronic diseases such as leprosy and tuberculosis; immunizations and prophylaxis. The agent would also be responsible for inspection with regard to village sanitation.

PMI-Midwife-Matron : Prenatal advice; nutritional advice; mensuration of village children, post-partum care; public health education and disease prevention.

In addition to the general duties outlined above, each member of the team is expected to have the responsibility for referring individuals or potentially serious situations to the proper authority in Keniéba.

As an adjunct to the health program a village safe-water supply is to be provided. This will involve putting in a series of wells which will be covered to avoid contamination. The exact location of the wells remains to be determined, but it is currently thought that two will be mechanically drilled in the town of Keniéba with electric pumps for pumping water into storage reservoirs. The other locations will be determined at the time of the project paper.

Finally, 18 man-months of technical assistance are proposed for a nutrition/health survey, supervision/assistance for the safe-water program and establishing a health management program for the Public Health Services in the area, primarily the paramedical team.

Health Component Budget
(U.S. Dollars)

1. Paramedical Team

All terrain vehicle	12,000
Spare parts	2,400
Medicines	30,000
Other supplies (syringes, etc.)	40,000
Operating support	30,000
Total	$ 114,400

2. Safe-Water Program

10-15 village wells, 12 mechanically drilled	275,000
Auxiliary equipment and supplies	18,000
Total	$ 293,000

3. Technical Assistance
(18 man-month at 10,000 per man-month including transportation and per diem) 180,000

TOTAL	$587,400
15% inflation and contingencies	$ 88,100
HEALTH COMPONENT TOTAL	$675,500

ACTIVITIES OF MOBILE HEALTH TEAM

HEALTH PROBLEM	INFIRMIER D'ETAT	AGENT DI SANTE PUBLIQUE	PMI-MIDWIFE-MATRON
ONCHOCERCHIASIS	Diagnosis: Examen for nodules eye changes, visual acnity. Treatment: Notazine Referral : To clinic for nodulectomy.	Recording: Rate of blindness incidence of new cases, black fly density. Referral : OCCGE for vector control	Education : Method of infection Need for treatment, Self examination for nodules.
M A L A R I A	Diagnosis : by history and temperature. Treatment : Chloroquine	Recording : Incidence of new cases, black fly density. Prophylaxis : adminiter GOM "Nivaquinization" program.	Education : Stress need for nivaquine in young children and value of insecticides use for control of mosquitoes.
SCHISTOSOMIASIS	Diagnosis : Examine urine and stool for gross blood-microscopic if possible. Treatment : Urinary type-metrifonate - intestinal type. Remove to clinic for treatment with ambilhar or amthiomaline.	Recording : Revalence and incidence, particularly in school age children. Epidemiology : Examine site of human-water contact for vector snails. Referral : Report presence of vector snail to OCCGE for control.	Education : Inform population of method of infection-important for school age children. Also of signs and symptoms of infection to be reported.
TRYPANOSOMIASIS	Diagnosis : Examine for cervical lymph node enlargement and skin rashes. If present, micro exam of blood for trypanosomes. Also for advanced signs of sickness. Treatment : Refer to clinic for Pentamidine treatment.	Recording : Incidence and prevalence. Tse-tse fly density. Referral : OCCGE for vector control.	Education : Inform population of method of infection. Also of need for reporting lymph node swelling and skin rashes.

ACTIVITIES OF MOBILE HEALTH TEAM

HEALTH PROBLEM	INFIRMIER D'ETAT	AGENT DE SANTE PUBLIQUE	PMI-MIDWIFE-MATRON
T R A C H O M A	Diagnosis : Differentiate from Onchocerchiasis. Treatment : Aureomy cin Ointment Referral : If advanced case, send to clinic for evaluation and possible eyelid operation.	Recording : New cases and record of treatment. Epidemiology : Examination of village area for sanitation hazards - Advise on method of correction.	Education : Inform population of method infection, prevention through sanitary habits. Stress need to report conjunti-vitis.
TUBERCOLOSIS	Diagnosis : Cough, fevers, weight loss, blood in sputum-should be considered indicative. Referral : Suspicious cases to clinic for medical diagnosis particularly infants. Treatment : BCG, butonly after confirmed diagnosis.	Recording : All known cases must have been seen at each visit. Record progress of treatment, health of other family members and report to OCCGE any residen-ce changes.	Education : Inform population of symptoms, stress importance of early treatment. Also stress TB as important cause of infant mortality. Conseil members of TB victims family on safest measures and care.
L E P R O S Y	Diagnosis : Persistant skin con-ditions or loss of nerve sen-sation (peripheral anesthesia), should be considered indicative Referral : Suspicious cases to clinic. Treatment : Of known cases, Dapsone.	Recording : All known cases must have been seen at each visit. Record progress. Notify OCCGE of any change in residence. Referral : Arrange for evacua-tion to institute if neces-sary.	Education : Inform population of symptoms and need for early treatment. Social : Arrange for support of family, particularly if insti-tuticnalization is recommended.
VENERIAL DISEASES	Diagnosis : Exam for lesions and secondary chancres. Treatment : As directed.	Recording : Incidence rates. History of contacts. Report : As required by OCCGE.	Education : Methods of prevention, signs and symptoms. Importance of treatment.

ACTIVITIES OF MOBILE HEALTH TEAM

HEALTH PROBLEM	: INFIRMIER D'ETAT	: AGENT DE SANTE PUBLIQUE	: PMI-MIDWIFE-MATRON
HEPATITIS	Diagnosis : Exam for jaundice bilirubin in urine. Isolation : During first week. Treatment : None	Recording : Incidence Epidemiology : Determine source of virus contamination - search for other cases. Report : All cases to OCCGE.	Education : Methods of infection. Relationship to transmission of other infections - Epidemic potential.
SKIN ULCERS & WOUNDS	Treatment : Antiseptic cleansing and dressing.	NO ACTION	Education :First aid training - Emergency evacuation - cleanliness.
MATERNITY	NO ACTION	NO ACTION	Education : Extension of prenatal exam and advice available at PMI. Recording : As with PMI.
CHILD HEALTH NUTRITION	Assist immunization Diagnosis : Detect signs of scurvey, etc.	Immunization : measless, smallpox, tetanus.	Education : As with PMI. Recording : Mesuration, immunization records. Social : Arrange for diet supplements if necessary.

Part IV. Project Beneficiaries

The approximately 34,000 people in and around the central arrondissement will accrue benefits from the project in one form or another. The majority will benefit from eased surface communications as represented by the construction of the two proposed road sections. Some 350 farm families should benefit immediately from the agricultural and cattle packages to be introduced to the area. The latter package could have far wider implications depending on how it is organized at the local level. A preliminary sociological survey has revealed that farmers who have yokes and pull animals make them available to their neighbors and others in the village. The arrangements will differ from village to village depending on the relationships which exist within the village society. In some existing cases the traction units are made available outright, and in others the farmers with the yokes and pull animal will hire out either themselves with their animals, or their animals for the plowing of others' fields. How this practice will be carried out in the project area will depend on how the villages organize themselves for the acceptance of the proposed animal units (see livestock component). Nevertheless, it is expected that some form of sharing will develop.

There is no notable ethnic rivalry which would constitute an effective hinderance to a development action. Aside from small regions near Fari, to the sourtheast of Keniéba for example (and not within the immediate project area), ethnic divisions follow clear geographic definitions. The largest part of the cercle has a large Malinké population majority. In other areas the dominant population majority is Peul, but never so clearly marked as in the case of the Malinké. Those areas with a considered Peul majority are generally the least populated areas of the cercle.

This last fact could be based on the way these two ethnic groups look upon how they maintain their livelihoods or economies. The Peul economy is based on livestock and the need for pasturage and adequate water. However, the Peul do farm in the area and do not have an exclusively livestock based economy. One can say that in this area, more so than anywhere else in Mali, the Peuls will devote more time to agriculture. The Malinké (and the related Diallonké) are all sedentary farmers. They will own some cattle or other livestock, but their major effort is devoted to an agricultural economy.

The area where the agricultural and livestock components are to be installed have a dominant Malinké population. They have a sedentary agricultural economy based on subsistence farming. However, because of their isolation, the lack of facilities and the inputs necessary for greater production, these farmers are unable to fully exploit the potential of available agricultural lands. The people themselves recognize that they are not fully exploiting the potential of their land and seek the means to do so. Primarily, they feel that by equipping themselves for plow cultivation they could show a dramatic increase in their production and revenues. Some have also expressed a desire to improve their methods of food grain storage, saying that they lose too much under present conditions.

The under utilization of the land and low productivity is heavily felt by the population. Often, to augment their meager existence, the people living on the plains around Keniéba will migrate to the surrounding plateaux in a search for gold. This is not a new or recent phenomenon and there has been an increase in the plateau population over the years. There are many

among the target population who appear to have relatives living and working on the plateaus . They believe that by the installation of a development project, which will provide definite benefits to the plains population, many of their kinsmen will return to the agricultural lands of the plains.

This seems to be a reasonable belief in as much as definite relationship between the plateau population and the plains population were established by the preliminary sociological survey. It seems most probable that at some point in time (and perhaps at the present) the villages installed on the plateaus have had a base on the plain, and vice-versa. In some instances there has been already a reverse migration from the plateau to the plain. This could be explained by the fact that the plateau population lives on soil with limited fertility, the villages are inaccessible except on foot, and the land does not lend itself to plow farming which is the dominant theme throughout the area. Also, thre are some farmers who reside on the plateau while cultivating fields on the plain. This tends to strengthen the contention that an attractive development project would tend to bring the population to the plains areas. These does not seem to be any obstacle to a progressive descent of people from the plateau to the plains as there exists some movement in this direction already.

The proposed project will also probably slow down, if not stop, seasonal migrations out of the area. Most of this migration goes towards Dialafara, Bafoulabe and Kita - - or major groundnut production areas. These migrants are generally the young who go to work in the groundnut cultivation of others in order to supplement the family income. During

the dry season when there is little or no cultivation, there is a return to the farmland of the area. It can be seen from this that there is a labor drain at the height of the growing season, which is partly attributed to the fact that the general revenue situation in the area is very weak.

All of the above is based on a very preliminary survey conducted over a seven day period, of which four were primarily spent just getting into and out of the areas surveyed. For the preparation of the project paper, it will be necessary to carry out a definitive sociological study which will clearly delineate the project impacts and implications for the sociological milieu of the project area.

This study is to be limited to the central arrondissement and its immediate surrounding area. The study should define the demographic characteristics of the population: its structure by age and sex; size of family constituting an economic unit; number of family members economically active; importance of seasonal migration and definitive emigration. It should bring forth and elaborate on the most felt needs of the population and show differences between villages, between categories of farmers, and between inhabitants of the plain and of the plateau. Last, but not least, the study must address the role of women. For the present it is safe to say that in this traditional society, as with most traditional African societies, women's time is devoted to the gathering of water, preparation of food, caring for children, raising vegetables for home consumption and marketing, as well as their share of work in the fields. There is, however, in Keniéba itself a very strong "Union des Femmes". The role

that these women play in the society and economy of the area should be studied and how this union might influence the project considered. The work necessary for this study should take at least a month including at least two weeks in the field.

The project will make no unreasonable demands for change on the part of the project beneficiaries. In fact, it will respond to changes already perceived as necessary by the target population. They recognize that more land can be tilled using animal traction, they have seen increased groundnut yields from farmers cooperating with Operation Arachide and are aware of improvements technological packages can bring, as with any isolated group they are desirous of a chance for improved surface communications, and they also recognize that they are not receiving the services that are necessary for an improved standard of living.

Because no other donor agency is, or has ever been, working in the area, an enthusiastic response to the project is expected. They have not yet been disillusioned by promises not fulfilled. Chances for success of the agriculture and cattle components are judged excellent because of an expected positive response from the population and the fact that the proposed implementing agency (Operation Arachide) has a cadre of hardworking, competent individuals in the area. As to whether or not the project is addressing the Congressional Mandate, the fact that the economy is virtually non-revenue producing just before the harvest makes this a moot question. Except possibly for nomads in the far reaches of northern Mali, this is probably one of the country's poorest regions.

PART V - FEASIBILITY ISSUES

As with any project there are very real questions of feasibility concerning the proposed project. It is felt that most of these can and will be answered satisfactorily once the project paper is developed. Nevertheless, major issues are enumerated below.

1. Accessibility

Many officials interviewed in the process of developing this PRP stressed that the major constraint to increasing agricultural production in the Kéniéba area is a lack of accessibility to major markets. Their desire is to improve the roads and tracks in the area to ease getting production out of the area to their markets. There is no doubt that this is a strong inhibiting factor, but perhaps not the overriding one so far as improved roads are concerned. The major constraint here is getting the inputs for improved agriculture to the farmer.

Farming in this area takes place during the rainy season - precisely when the roads and tracks are impassable. A technological package may be delivered to the farmer just before or at the beginning of the growing season, but because the roads are impassable, no follow-up work can be carried out by extension agents. There is no assurance the package is being properly utilized. This same constraint is evident in the lack of delivery of other services to the inhabitants of the area.

There is also a question as to whether increased accessibility might not work inverse. The possibility always exists that the easing of surface communications for marketing might also make it easier for people to migrate away from the area.

2. Lack of Transport and Storage Capacity

Increased agricultural production will have to be consumed locally, stored locally and transported to market. Major bottlenecks in transportation and storage capacity will have to be faced. Some of these problems have been anticipated in the consideration of the project. Provision is made for village and cercle storage capacity at the local level, and assistance to Operation Arachide for transporting surplus production to regional storage facilities by way of providing a truck for this purpose.

3. Lack of Production Incentives in Governmental Price Policy

It can be questioned whether the GOM's official prices offered for agricultural commodities provide an effective incentive for increased production, even with the availability of subsidized farm inputs. It is necessary, therefore, at the time the project paper is developed, to have a micro-economic study to determine the cost to the farmer for increasing his production. This study should include and possibly recommend a credit approach which will be equitable to the farmers. Assuming this credit would be routed through Operation Arachide, any discussions and recommendations would have to be consistent with its policies.

4. Marketing Constraints

Constraints on marketing include the previously mentioned transportation and storage problems as well as demand. The principal markets for increased production in the Kéniéba area are expected to Kayes and Bafoulabé/ Mahina, with a possibility of even reaching Bamako. One would also expect that some production would reach across the borders into nearby Guinea and Senegal. Of the increased production expected, rice will probably be the

most easily marketed with beef next. Nevertheless, a market survey will have to be part of the economic analysis for the project paper. This survey should include the possibility of an export market with access to the railhead at Kayes and/or Mahina, this is not an unreasonable possibility.

5. Technical Issues - Agriculture

An agronomist was not available for the development of this PRP. Therefore, it is necessary that one be available to spend sufficient time in the area for the project paper. To an untrained eye, the land in the project area looks rich in its potential for production. However, definitive recommendations need to be made as to the possibilities or necessity for crop rotation, types of fertilizers to be used in the area, what, if any, detrimental effects plowing under existing grass will have on the area, and whether or not herbicides should be recommended as part of the production package.

6. Technical Issues - Cattle

There are few technical issues regarding this component. N'Dama cattle can be readily purchased in Mali for this component. It will, however, have to be determined the exact method and where they can be broken to the yoke with their drivers. This should not be difficult to ascertain as Mali has probably the highest utilization rate for animal traction in West Africa. Time constraints alone prevented making definite recommendations at this time. The only other question revolves around the sociology of cattle in a sedentary farming society. The answers to this should be determined when the project social soundness analysis is completed.

7. Technical Issues - Road Construction

The equipment availabilities in the First Region are currently inadequate to the task being proposed here as well as the proposed road program under the auspices of the OMVS. A primary concern is the lack of maintenance

by Travaux Publics. Part of this latter problem is being addressed by the IBRD under their Third IDA highway credit, wherein technical assistance is being provided in road maintenance. Between this project and the OMVS roads project, equipment is being selected and provided specifically to address both road construction and continued maintenance. The OMVS roads proposal also has technical assistance and training for Travaux Publics personnel geared specifically to the First Region. It is believed that the current constraints can be overcome with a minimum of difficulty.

8. Technical Issues - Health

The Kénièba area has all the major tropical diseases prevalent. It would be an impossible task under this initial effort at development assistance in the area to address them all. It is recognized that the proposed activities outlined in the charts attached to the health component cannot be carried out by one mobile team. However, this proposal is to show a beginning in the delivery of health services to the project area. Specific tasks of the health team will have to be developed and outlined at the time of the project paper. This will be coordinated with the Ministry of Health and local health personnel. If child mortality can be reduced through immunizations, improved nutrition and parental education, a tremendous service will have been rendered to the area.

9. Other Issues Affecting the Project

Procurement waivers are an issue that come up with all projects in French-speaking West Africa. There is always a question of requesting waivers for 935 procurement of vehicles. The proposed project is no exception. A waiver will be required for the procurement of project mobylettes. These two wheeled vehicles can be procured locally from Industrie Malienne du Cycle et du Cycle Moteur (IMACY). IMACY receives the mobylettes TKD and assembles

them in Bamako. The unassembled parts are manufactured in France.

The procurement of other vehicles is always a source of contention in this part of the world. Waivers for procurement are necessarily sought because of a lack of adequate franchises with back-up servicing and spare parts after sale. If SER/COM is able to get adequate assurances from American manufacturers that they can and will provide vehicles (1) that will stand-up under the difficult conditions in which they operate (this may require special specifications for a strengthed chassis and suspension system); (2) that they will guarantee that spare parts will be available as needed; and (3) that there will be local mechanics trained to maintain these vehicles, a waiver will not be sought. If these conditions cannot be met, it will be regretfully necessary to seek a waiver for procurement of the all terrain vehicles needed for the project. The heavy equipment will be of U.S. source and origin. It is anticipated that all other procurement will be 941 plus Mali

10. How AID Views the Project

The proposed project is a development project. Though there was no economic analysis carried out, it is doubtful that one could project an "honest" positive rate of return for the project. There is no real data on which to base an economic analysis in terms of a cost/benefit ratio or internal rate of return calculations. The project is in an area which has little or no relevancy to the national economy. Comparing it with other regions which have considerably more economic activity would be an unfair comparison. It is nevertheless requested that a competent agricultural economist be a part of the PP team in order to determine what kind of economic impact this project will have on the target population.

How AID views this project is therefore very important. The AID mandate is to direct its assistance to the "poorest of the poor" - - the people located in the project area are, by anybody's definition. AID is to introduce appropriate technology - - that is proposed for this project. AID is to address itself to "right to food" issued and help the hungry increase food production -- this project addresses that issue. Finally, by viewing the proposed project in terms of its developmental potential rather than in terms of economics, there is the possibility that future assistance to the area will be able to show the positive rations and returns desired.

11. Section 110 (a) of the FAA

Mali is one of the poorest countries in the world. It has oppressive bebt burdens and budqetary difficulties. It is, therefore, to be requested that waiver of the 25 percent requirement be granted.

PART VI - FINANCIAL PLAN

The financial plan as presented on the accompanying two tables reflect the most accurate and reasonable costs of the project as of mid-November 1976. It will be noted that each budget as presented in the body of the paper has a built in inflation and contingency factor of 15%. This could be reasonably accurate if the funds were obligated and totally expected whithin the first few months of FY 1978. However, because inflation has been at a rate of 7-10 percent or more per year, compounded, an additional factor of 15% has been added to reflect probable costs over the three year disbursement. That is to say, that the funds will be utilized over a span of years ending approximately four years from the time of the preparation of the PRP. Though the overall project total cost is not expected to change much from what is reflected here, there will undoubtedly be changes (either increases or decreases) in specific categories as the elements of the project and their costs are further refined at the time of the Project Paper.

The project funds are to be a grant to the Government of Mali in reflection of its somewhat precarious budget situation. It will also be noted that AID is contemplating picking up a substantial amount of local currency costs (including operating support). This too reflects the GOM budgetary condition as well as the fact that much of what is needed for the project in terms of materials and supplies can be locally procured.

Finally, their remains the issue of the GOM contribution to the projectproject, at this point in time it would be unreasonable to expect the GOM to live up to the requirements of Section 110 (a) of the FAA and contribute a minimum of 25 percent. A GOM budget analysis for the PP will

no doubt further strengthen the case for waiving this requirement. Also note that under "other" in the Summary Cost Estimate table, a question mark has been placed. This was done because there was not sufficient time to develop a formula for valuing the land that will be brought under cultivation and the value of labor of farmers and others who will prepare the land for cultivation.

The final design will require the services of five consultants in relevant fields and a direct-hire design officer. The cost of this design should be approximately $65,000 for a six week effort including at least 3 weeks in the field for each specialist to become fully aware of the conditions and problems associated with the area and the project.

PRP

COSTING OF PROJECT OUTPUTS/INPUTS

(US $ 000)

Project No. 688- Title: FIRST REGION INTEGRATED RURAL DEVELOPMENT

	Project Outputs				
Project Inputs	No. 1	No. 2	No. 3	No. 4	TOTAL
Summary of Total Project Costs					
Equipment	1363.8	80.6	18.7	16.6	1,479.7
Mat. & Supplies	1672.2	256.4	126.2	480.1	2,534.9
Tech. Assistance		13.2		238.1	251.3
Training		33.1			33.1
Oper. Support		72.7		39.7	112.4
TOTAL	3036.0	456.00	144.9	774.5	4,411,4

PRP

SUMMARY COST ESTIMATE AND FINANCIAL PLAN

(US $ 000)

Source	AID		HOST COUNTRY		
	FX	LC	FX	LC	TOTAL
US					
Equipment	1,179.9	105.0			1,284.9
Materials	1,458.3	493.7		100.0	2,052.0
Supplies	153.1	101.0		50.0	304.1
Tech. Assis't	207.0	11.5			218.5
Training	23.0	5.8			28.8
Operating Support		97.7			97.7
Personnel				180.0	180.0
Other				?	?
Inflation Factor	302.1	81.5		49.5	233.1
Contingency	151.1	40.7		16.5	208.3
TOTAL	3,474.5	936.9		396.0	4,807.4

Part VII - Implementation Plan

1. Implementing Agency

Prime responsability for project implementation is to rest with Opération Arachide et cultures Vivrieres (OACV or Opération Arachide). OACV was created in 1976 to focus development of the production and marketing of groundnuts. In 1974 it was expanded to include an emphasis on cereals as well as activities in the fields of functional literacy, human and animal health, road construction research and evaluation. The operation's area stretches for 850 kilometers across the upper middle belt of arable Mali, from the border with Guinea and Senegal to Upper Volta. Within its zone there are about 100,000 farm units and twenty percent of the Malian population.

To encourage groundnut production OACV undertook and continues the extension of technical improvement packages. The first addresses itself to productivity and the second to modernization. The former is set for wide distribution while the latter is limited to small numbers of innovative farmers who are also able to purchase oxen and equipment for animal traction. The use of selected seed, fungicide, early sowing, greater density and proper weeding are the emphases of the productivity theme. Modernization emphasizes a more rational exploitation of the farm unit, the use of fertilizer and animal traction, and the integration of livestock and crop production.

For the project area herein concerned, Opération Arachide will consider a "combination" of these two approaches. With the support of AID, OACV will continue its productivity themes while at the same time introducing a modernization theme in concert with the livestock service for increased cattle production. The innovation will involve the lending of a bovine unit

(see livestock component) to be repaid in kind. It is not expected that all units will include the farm implements package, though provision is made for this. Some of those farmers who participate in the livestock component may, at a later date, adopt the modernization theme for agricultural production as their incomes increase from beef sales. The repayment in kind system will operate in a revolving fund manner in that OACV will be able to continue expanding cattle operations as the initial units are replaced.

Opération Arachide currently has 7-10 agents working within the cercle of Keniéba (the PRP team met and talked with 7 but understands there are 2-3 others), including one concerned with livestock. The livestock service has two people located in Keniéba itself. At the outset of project implementation it is not believed that these levels of personnel will be increased, but by the second year, it is expected an additional five will be necessary. At the time of the Project Paper preparation this will, of course, have to be further evaluated and discussed with Opération Arachide. It is recognized that this coverage is to be more encompassing than is usual in other areas where OACV is operating. In some sectors, OACV agents cover 250-300 farm units which is rather thin coverage. In some areas 50 percent of the farmers see extension agents less than four times a year. This is not the case in the Keniéba Cercle which could be a function of the fact that OACV has only recently begun operations. For this project, the increased coverage must continue.

Regardless of the level of coverage, OACV is the only agricultural service in the area which has sufficient broad experience to carry out

the project. Its personnel are hardworking and dedicated people who leave a lasting impression of very real competence.

2. Road Construction

The 100 kilometers of roads to be constructed will be the responsibility of the Travaux Publics. This construction is to be coordinated with the proposed OMVS/Mali Roads project. Travaux Publics, through a Travaux Neufs brigade is currently completing construction of the FAC-funded Kayes-Keniéba road. This road, however, involves earthwork only and not the necessary drainage structures to provide year round access to Keniéba.

In concert with the OMVS/Mali project, public works units will be trained in the construction and maintenance of rural roads of various classes (see road construction component). This training will include operation and maintenance of equipment (as required), precosting of concrete drainage structures and their assembly on-site, and moving and placement of earth in the road construction (again as required). It is expected that a considerable amount of this training will take place on the job-site under the supervision of Travaux Publics engineers and the technical assistance engineer being provided under the OMVS/Mali Roads project.

3. Livestock (Cattle) Component

The livestock component will require probably the least amount of management or oversight. Both Service Elevage and Opération Arachide have veterinary technicians working out of Keniéba. They are competent, but lack many of the means to deliver the services which are intended. In

most cases this is primarily a lack of transport and supplies. For the project paper, a more complete inventory will have to be taken of the area livestock services capabilities, but for the present it is believed that the project as outlined in this paper is adequate based on preliminary investigations.

The implementation of the cattle component can commence immediately upon approval of the project paper and signing of the grant agreement. The first objective will be to identify and select the herd of 480 head of cattle to be introduced into the area. At the same time the equipment proposed and necessary supplies can be ordered for timely delivery. Most of what is required for this project component can be accomplished in advance of the access road to be constructed.

4. Health Component

This is the least known quantity of the project. Though it is obvious, and has been observed, that most of the diseases of tropical African are prevalent in the area, how to approach them is a very real problem. The project as proposed first aims at strengthening the health delivery services in the area by establishing a mobile health team. This will answer one need of getting services to people who presently have no access to them. The second major component is the technical assistance to be provided. This assistance should commence as soon as possible after project approval and signing. The purpose of this assistance will be to identify with the health services the most prevalent treatable diseases and to establish a method for bringing services to the populace. Further technical assistance will

be provided as specific problems are identified with the type of assistance required.

Regarding the well drilling aspects of the program, this is recognized as a need which, if fulfilled, can have an immediate impact on some of the gastro-intestinal problems in the villages to be affected. A baseline study of the incidence of waterborne diseases is to be carried out at the beginning of the project.

A follow-up study 2 years after the wells are in place will evaluate effectiveness.

5. Implementation Schedule (Preliminary)

December 1976	:	PRP Submitted AID/W
January 1977	:	PRP approved
March/April 1977	:	Final Design
May 1977	:	CDO Review and Refinement of PP
June 1977	:	PP submitted to AID/W
July/Aug. 1977	:	PP reviewed in AID/W
September 1977	:	PP approved
October 1977	:	Project Authorized
December 1977	:	Project Agreement signed
January 1978	:	Implementation Letter issued
February 1978	:	Conditions Precedent met by GOM
March 1978	:	Equipment ordered
April 1978	:	Appraisal of N'Dama for Pilot Herd

April 1978	:	Agricultural Commodities ordered
May 1978	:	Recruitment of Health Technical Advisor
June/July/Aug.	:	Little can take place... Rains.
September 1978	:	First equipment arrives
September 1978	:	Health Technical Advisor Arrives
October 1978	:	First N'Dama Units sent to area
October 1978	:	Health Technical Advisor - Field work
November 1978	:	Survey of roads commences
November 1978	-	February 1979 : above two continue
February 1979	:	Training of farmers in animal traction
March 1979	:	Agriculture inputs delivered to OACV
March 1979	:	Health TA delivers report and recommendations
April 1979	:	Well drilling program commences
May 1979	:	Heavy equipment arrives
June 1979	:	Cattle and Agriculture operations commence
July/August	:	Little takes place... Rains.
September 1979	:	OACV reports on Agriculture aspects
October 1979	:	Road construction commences
October 1979	:	Health Services delivery commences
November 1979	:	First harvests to be appraised
January 1980	:	Second visit of Health Advisor
March 1980	:	Wells completed
June 1980	:	Road completed
September 1980	:	Final disbursements
1 9 8 1	:	Overall project evaluation.

6. Implementation Issue

There is a question of how AID/W may wish to view the implementation of this project. While the project could perhaps be monitored by the soon to be augmented CDO staff, the CDO views the project as so complex and remote as to require a specific, full-time project manager. Thus the projected budget of $ 4,411,400 will have to be increased by at least $ 300,000 to a total of $ 4,711,400 to cover the costs of the project manager.

Part VIII - Development Schedule

The final design of the project must be completed by the end of May 1977 for easy FY 1978 funding. Any time later than that would make it impossible for the design team to carry out necessary field work. By mid-June the rainy season is well launched and the project area is inaccessible until the following November.

It is not anticipated that any prefeasibility studies are necessary if the proper mix of specialists is recruited for the design team. This will be even less a consideration if the team arrives in-country at the same time! The preparation of the PRP was hampered by the fact that the proper mix of specialists was not available first of all, and secondly, that those who did arrive came at inconvenient times necessitatint two difficult trips to the project area for too short a time and with little coordination.

Personnel required for the design are as follows:

Project Design Officer : from REDSO/WA and familiar with Mali and the Malian officials responsible for the various project segments.

Agricultural Economist : AID/W or contract. This person must be familiar with West Africa (especially Francophone and hopefully Mali). He/She must also have an open mind in viewing this project in terms of its development potential and not only in terms of an IRR and Cost/Benefit ratio.

Agronomist : AID/W or contract. The PRP did not have the benefit of an agronomist and it is imperative that one be included on the PP design team. This person should also be familiar with Africa (Francophone West

Africa and Mali), know soils analysis, be able to recommend crop potentials and advise on possible environmental effects (see IEE).

Rural Sociologist : AID/W or contract. The sociologist assigned to the PRP team only had nine days to work. Four of these days were spent traveling and two days trying to write something from a very cursory survey. This person should, again, be familiar with Frenchspeaking West African and hopefully Mali. He/She should also be willing to spend up a month in the field under somewhat adverse conditions.

Health Specialist : AID/W or contract. Again someone familiar with Frenchspeaking West Africa and hopefully Mali. This person does not have to be an M.D., but should be familiar with public health delivery systems and tropical diseases.

Livestock Specialist : AID/W or contract. As with the others, someone familiar with Frenchspeaking West Africa, especially the types of conditions in the Guinea-Savannah zone. He/She should be familiar with the N'Dama breed of cattle and their characteristics. This person should also be able to advise on veterinary, nutrition and herd management practices.

Civil Engineer : AID/W or contract. It is not anticipated that the REDSO engineers will be able to be released for the length of time necessary to carry-out the duties of this engineer. He/She must be familiar with road construction, building construction and well digging. This person should also be able to review plans and specifications and recommend possible modifications for the most economical means to carry-out the project. He/She must be willing to spend sufficient time in the field

to do an adequate survey of the needs as well as survey costs in Bamako.

Depending on availability, it would be most useful to have a staff member of the CDO/Bamako as design team leader. If not, the Project Design Officer should carry this load as none of the contracted specialists are expected to have enough familiarity with Mali and the project area.

AID/W and/or the CDO will be expected to draft the specific terms of references for the design team specialists. It is anticipated that this will take place after review and approval of the PRP. It should also be noted here that the economist, sociologist and engineer could all be used, on the design team for the OMVS/Mali roads project which should be designed concurrently with the project proposed herein.

Timing for this proposed project is for March and April of 1977 over an anticipated six week period as follows:

Week 1 - Arrival, settling in and contacts with relevant host government officials,

Weeks 2-4 - Field Work,

Weeks 5-6 - Report drafting and negociations with host government officials to resolve possible conflicts and issues.

As available, CDO/Bamako staff will lay the groundwork in advance of the teams arrival and assist with hostgovernment consultations. It would be most useful if the CDO and/or REDSO project officer have the opportunity to participate in selecting the staff and giving them their briefings.

Project Logic

The overall goal of this project is to improve the lives of the rural poor in one of the poorest and least accessible areas of Mali. The area is potentially productive, however, and it should be possible not only to seek self sufficiency but also to build up reserves for emergencies and a possible export capability in certain food stuffs. Rural incomes will increase.

It is, however, recognized that increased food production alone will not necessarily bring about an improved standard of living. The rural poor of Mali more often than not lack most of the basic services which are inherent to improved incomes and a higher standard of living. Therefore, this project is looking to integrate four major development components for a threefold purpose. This threefold purpose includes breaking the isolation of the area, providing the means for extending services to the population which, in turn, will help to increase the economic activity, thereby providing the population an avenue to improve their standard of living.

To meet this purpose, it is first of all necessary to bring the area into the mainstream of its region. Presently the area is totally isolated for 3-4 months of the year. Therefore the road is necessary to assure that surface communications can be maintained. Furthermore, this potentially rich agriculture area needs to have the means for getting its increased production out for marketing, again a need for improving, if not actually providing, a surface communication link.

Finally, this surface link will make it possible for the services already present in the area, and those envisaged for this project, to reach their constituencies.

Secondly, if people are to reap the benefits of their labors, and in fact to be able to labor, they must have a reasonable measure of access to health care, and the means to maintain their health. Therefore, the project proposes a component to improve and extend the facilities of the health services of the area. The project recognizes that improved health is a major component of an improved quality of life.

In this same vein, if economic activity is to be increased, the beneficiaries of the project area must have access to other necessary services. In recognition of this, the project is providing the means to extend the services of those concerned with livestock and agriculture in the area. If changes are to be promoted, and new technologies introduced, this is necessary.

Finally, it should follow that economic activity should increase in the area once its isolation is broken and the people of the area are receiving necessary services. There are those who believe that farm output would increase by 25 percent if the area inhabitants were assured of reliable surface communications alone. This increased economic activity will then provide the project beneficiaries much of what is necessary to improve their lives as perceived by others. There is no doubt that much of what is projected for the project meets the needs

and desires of the project area inhabitants as they temselves have expressed these needs.

There are of course certain assumptions that one must make when considering the success of the proposed project. First, of course, is that AID and GOM will support a project in a high rainfall zone. Mali is a Sahelian country and the Sahel zone in Mali is generally belt to the poorest and least fortunate part of the country. Accordingly, AID has concentrated most of its attention on that zone and most projects presented by the GOM to AID have addressed its needs. We assume that the area of this project being every bit as remote and poverty stricken as the Sahel, despite its high rainfall, will merit AID and GOM support. Secondly, this is a project truly oriented toward the rural poor in an area that has been completely ignored by the donor community. Therefore, perhaps the most important assumption is that AID will look upon this project for its potential to improve the lives of the rural poor and not dwell unduly on the economics of the proposed project. While economics are certainly relevant, this project at its early and untested stages, should not be expected to meet strict economic requirements as a test of its success. All other assumptions, as shown in the preliminary logical framework attached to this paper, are secondary in importance to the above two.

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Narrative Summary	Objectively Verifiable Indicators
Program or sector goal : To directly improve the quality of the lives of the very poor inhabitants of Keniéba Cercle.	Measures of Goal Achievement: Evidence of increased economic activity in the project area, marketing of surplus crops and a reduced incidence of easily treatable diseases.
Project Purpose: 1. To increase the economic activity of the Cercle of Keniéba and improve the general level of health. 2. Extend the agricultural, livestock and health services of the Cercle of Keniéba. 3. Provide access to the plain of Moussala and areas between there and Keniéba.	End of Project Status: 1. Increased crop and livestock production and marketing. 2. Cercle residents receiving regular visits by personnel of various services. 3. Regular surface communication available to residents in the project area.
Outputs: 1. Rural roads 2. New land under cultivation 3. Expanding cattle industry 4. Improved village water supplies and delivery of health services	Magnitude of Outputs: 1. 100 kilometers of rural roads built and being maintained. 2. 1,700 has. of land under cultivation 3. 1 paramedical health team making regular visits to 20-25 villages in the central arrondissement. 4. Initial herd of 480 head expanded to 817 (year 3) 5. 10 village wells in place and operating with pumps.

Inputs :	Implementation Target : ($ 000)

USAID

	Year 1	Year 2	Year 3	Year 4
1. Equipment	1,100	185	-	-
2. Materials and Supplies	1,500	535	500	-
3. Technical Assistance	72.83	72.83	72.84	-
4. Training	-	14.4	14.4	
5. Operating Support	32.56	32.56	32.58	-

G O M

1. Personnel 2. Other	96	100	100	100

Means of Verification:	Important Assumptions:
1. Operation Arachide records of crop commercialization and other national statistics. 2. Statistics of Public Health Services.	Assumption for Achieving Goal: 1. Food self-sufficiency is a valid and desirable goal for Mali. 2. Rural inhabitants willing to make necessary changes to improve quality of rural life as perceived by others.
1. Operation Arachide records and statistics. 2. Surveys of area commerçants 3. Statistics of health and live-stock services, and OACV. 4. Project Evaluation.	Assumption for Achieving Purpose: 1. GOM will support food production project in project area. 2. GOM agrees breaking isolation of Keniéba Cercle a worthwhile effort. 3. GOM will support expansion and extension of services in area.

Logical Framework (Cont'd)

1. Project evaluation. 2. Records of Travaux Publics 3. Records of Operation Arachide. 4. Recors of Public Health Services unit.	Assumptions for Achieving Outputs: 1. Cereal and meat prices will be such that farmers willing to accept changes and input packages. 2. Services can be expanded and extended with a minimum of demands and inputs. 3. Cattle for initial herd can be bought in Mali and transported to area.
1. AID record. 2. Suppliers envoices 3. GOM records. 4. PPT/CPI	Assumption for Providing Inputs : 1. AID will provide funds on a timely basis. 2. Suppliers can provide equipment, materials and training as needed. 3. GOM can and will provide necessary personnel. 4. Land will in fact be exploited by farmers.

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INITIAL ENVIRONMENTAL EXAMINATION

Project Location :	Country of Mali, West Africa in the southwest Sudano-Guinea zone of the country.
Project Title :	First Region Integrated Rural Development
Funding :	FY 1978 -- $4,411,400
Life of the Project :	4 years
IEE Prepared by :	Laurance W. Bond - REDSO/WA Date : November 17, 1976
Environmental Action Recommended :	No further environmental assessment or study is necessary except as requested in the accompanying summaries.
Concurrence :	_____ Country Development Officer Date: _____

Assistant Administrator's Decision :

Approval: _____

Disapproval: _____

Date: _____

INITIAL ENVIRONMENTAL EXAMINATION

I. Examination of Nature, Scope and Magnitude of Environmental Impacts

The proposed project for Integrated Rural Development in the Cercle of Kenieba, of the First Region of Mali will have minimal impact on the physical and social environments of the region. The project is designed to be a complement to, and an extension of services already present in the area, and to break the isolation of the area so these services may reach a larger portion of the population than is presently the case.

A. Description of Project

The First (or Kayes) Region of Mali is an isolated area of approximately 128,000 square miles. The region encompasses three ecological zones: (1) Sahelian; (2) Sudano-Sahelian; (3) Guinea- Savannah. Because much of the Region lies within the Senegal River Basin, it has been considered that development of the Region can wait for the implementation of development projects of the Senegal River Basin Authority (the OMVS). To do so, however, would probably mean that no meaningful development in the Region would take place over the next ten years. This is especially true of the proposed project area.

The proposed project is to be placed in the central arrondissement of the Cercle de Kenieba, in the extreme southwest corner of the First Region. It borders on the Faleme River close to the frontiers with Guinea and Senegal. Because of a lack of surface communications, the area is an isolated enclave for much of the year. The inhabitants of the area are among the poorest in Mali, though there is believed to be tremendous agriculture potential.

The project comprises four elements, all of which are interrelated and intended to improve the quality of life for these rural inhabitants. The first component involves the improvement and construction of up to 100 kilometers of rural roads. These roads will be designed to require as little annual maintenance as possible. The project will purchase necessary equipment for construction and maintenance, and in conjunction with the proposed OMVS/Mali roads project, will include training and technical assistance to the GOM Travaux Publics.

The second project component is agricultural development to take advantage of the area's high rainfall (1200-1300 millimeters of rainfall annually). It is expected that up to 700 hectares of rainfed rice can be brought into production, 200 hectares of vegetables and at least 600 hectares of other, traditional crops with increased yields. This component will include support for technological packages for farmers, farm equipment, fertilizers, pesticides and herbicides, and support to the marketing system.

A third component addresses the need to increase livestock production in the area, in this case cattle. A scheme has been worked out whereby some 480 head of cattle will be brought into the area with a view to multiplying the herd. Included in the package will be assistance to the livestock service to provide a complete package of services to the immediate participants as well as extending these services to others who already have herds. At the end of a five-year period it is expected that over 900 head of cattle will have been added to the cattle population.

The fourth and final project component addresses itself to the health needs of the area. Presently, it is estimated that less than

10% of the cercle population is able to take advantage of the health services of 11 clinics located in the cercle, most of which are located in the "chef lieu du cercle", Kenieba. The project proposes to establish equip and support a mobile health team operating out of Kenieba. This will include medicines, equipment and an all-terrain vehicle to give them access to remote areas. As a corrolary to health services, it is also proposed to start a village safe-water program by providing some ten village water supply deep wells. Also through the agriculture program introduce tomatoes and perhaps citrus fruit to address an observed Vitamin C deficiency.

B. Identification and Evaluation of Environmental Impacts

There are no significant environmental impacts associated with the project. There is a possibility that the human population will increase slightly, which is desirable. These people, however, will primarily come from the plateau areas in the immediate vicinity of the project area. They are of the same ethnic origins and in many cases have familial ties with the people of the target population.

It is not expected that the increase in the cattle herd population will have any deleterious effects on the environment. The grass lands in the area could easily support more than three times the livestock population in the Cercle which is currently estimated at 26,000 cattle, 22,500 sheep and 11,000 goats.

The only possible negative influences will be the introduction of fertilizers, pesticides and herbicides into the area, and the turning of soil and plowing under of grasses for agricultural production. It is

suspected that these could cause some changes to soil characteristics and possibly effect some minimal changes on water characteristics. However, this latter is unknown. Nevertheless, it is requested that an agronomist with soils experience and knowledge be included on the PP team so that these questions can be answered.

The only other environmental impact expected is a possible moderate change in the socio-economic realm through changes in economic and employment patterns. This is a positive, hoped for change inasmuch as the project is aimed at increasing the economic activity of the area. It is hoped that the present seasonal out-migration of the younger farmworkers will be slowed or halted so that they can take advantage of the project inputs to increase the incomes of the population thus providing them the means for improving the quality of their lives.

For a further discussion of the possible impacts, see the attached Discussion of Possible Impacts.

II. Recommendation for Environmental Action

Based on the above and the analyses attached, it is recommended the Threshold Decision of the Assistant Administrator be that the project will not have a significant effect on the environment, and therefore a Negative Determination is appropriate. Except as noted and requested above and in the Discussion of Possible Impacts, no further Environmental Assessment or study is necessary.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas	Impact Identification and Evaluation
A. Land Use	
1. Changing the character of the land through:	
a. Increasing the population	L
b. Extracting natural resources	N
c. Land clearing	L
d. Changing soil character	L
2. Setting natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
B. Water Quality	
1. Physical state of water	N
2. Chemical and biological states	U
3. Ecological balance	N
C. Atmospheric	
1. Air additives	N
2. Air pollution	N
3. Noise pollution	N
D. Natural Resources	
1. Diversion, altered use of water	N
2. Irreversible, inefficient commitments	N

Impact Areas and Sub-areas	Impact Identification and Evaluation
E. Cultural	
1. Altering physical symbols	N
2. Dilution of cultural traditions	N
F. Socio-Economic	
1. Changes in economic/employment patterns	M
2. Changes in population	N
3. Changes in cultural patterns	N
G. Health	
1. Changing a natural environment	L
2. Eliminating an ecosystem element	N
H. General	
1. International impacts	N
2. Controversial impacts	N
3. Larger program impacts	N

INITIAL ENVIRONMENTAL EXAMINATION

Discussion of Possible Impacts

A. LAND USE

1. Changing the character of the land through:

a. Increasing the population of people or animals in an area. It is not believed that there will be any significant in-migration of people to the project area. That which could occur would come from the plateau areas in the immediate surrounding area. These possible migrants are ethnically related to those in the plains of the project area. Quite often there are also familial ties. The project does propose to increase the cattle population in the area. However, in the opinion of livestock experts, the project area can support many times the number of cattle presently there. Nevertheless, there will be an increase, though slight. At the end of five years, this increase is expected to amount to only 918 head. At the projected rate of increase it would take about 15 years to double the animal population. Government officials have stated that until a "mysterious cattle disease" (probably bovine pleuropneumonia) decimated the herds, there were two-thirds again as many cattle as presently there. The increase in cattle could have a positive effect, inasmuch as their grazing will inhibit the growth of tall grasses, the natural habitat of the tse-tse fly. The inhabitants of the area currently burn the grass during the dry season for precisely this reason.

b. Extracting natural resources such as minerals or water. There will be no extraction of natural resources. Ten village water supply wells are proposed, but their effect on the water table in this high

rainfall area will be nil.

c. Land clearing. The land in the area is Guinea Savannah with a tree canopy amounting to about 15%. The soils nearer the Falémé River appear to be rich alluvial soils. In other areas grasses grow on a laterite plate. Though it is not expected that bringing currently untilled lands under cultivation will have any impact, it is requested that an agronomist with soils experience examine that possibility at the time of the Project Paper. The road construction proposed will be absolutely minimal. Sixty percent of this will be upgrading an existing road, so no new right-of-way will be required. The remaining 40% will involve little clearing except for the movement of earth. There will be no sedimentation or contamination of water courses due to earth-moving and operation of heavy equipment. There will be no untoward effect on wild-life and little vegetation will be destroyed.

d. Changing the character of the soil. As previously stated in paragraph 1.a., there is little chance of over-grazing and an agronomist with soils experience is requested for the PP team to examine the effects of the project on the soil (including the potential use of herbicides and pesticides).

2. Altering some of the significant natural defenses provided by an area.

These will be no significant alterantion of the area except for the turning over of soil for planting. No defenses of nature will be touched, therefore no impact is expected in this regard.

3. Foreclosing important and perhaps better uses of the land. The land proposed for development in the area is best suited for agricultural purposes. No wildlife habitats will be destroyed or altered.

4. Jeopardizing man or his works because either is put into a zone of potential danger. There is no perceived possibility of this.

B. WATER QUALITY

1. Changing the physical state of the water. No impact on the physical state of the water in the are is anticipated. No deforestation is to take place and there will be no sedimentation or contamination of water courses due to earth moving and operation of heavy equipment.

2. Changing the chemical or biological states of the water. No changes are expected, though this is not known positively because of the fact that some fertilizers, pesticides and herbicides may be used in the agricultural component of the project. Though this use is anticipated to be minimal, it is requested that the agronomist again investigate the possibilities of a deleterious effect at the time of the PP.

3. Changing the ecological balance of a water body, thereby changing its chemical and biological balance. No effects on the ecological balance are anticipated. The only possible effects on water quality were noted above concerning the possible introduction of fertilizers, pesticides and herbicides.

C. ATMOSPHERIC

1. Air Additives. There will be no massive use of pesticides or herbicides in such a manner as to deleteriously affect the atmosphere. The possible effects of these on soil and water have already been discussed.

2. Air Pollution. There will be no significant adverse effect on the air quality. The fumes generated by the engines of heavy construction equipment, which are constantly on the move, will quickly dissipate. The vehicles brought into the area by the project will have little or no effect as traffic of all types is not significant enough to be harmful.

3. Noise pollution. Except for the noise generated by heavy construction equipment, no noise pollution will take place.

D. NATURAL RESOURCES

1. Diversion, storage or increased use of water. There will be no diversion or storage of water. Some increased use of water might result from the village water supply wells, but this will hardly have any effect on the aquifers of this high rainfall area.

2. Irreversible or inefficient commitments of natural resources. None will be affected as no forests will be cut down, the grasslands are deemed almost unlimited and no wildlife habitats will be affected.

E. CULTURAL

1. Altering or destroying important physical symbols of a culture. None will be altered or destroyed.

2. Diluting a culture, possibly through methods such as introducing alien cultures, or dispersing or otherwise adulterating the indigenous culture. There will be no dilution or adulteration of the indigenous culture.

F. SOCIO-ECONOMIC

1. Changes in patterns of economic growth and employment. This is a hoped for positive impact. By providing the means for something other

than a subsistence existence, the project hopes to slow or stop seasonal migrations and generate the revenue necessary for the target population to improve the quality of its life.

2. Movement, resettlement, or changes in population. Little impact is expected except as noted above and in paragraph A.1.a. regarding the plateau population.

3. Changes in cultural patterns that could affect socio-economic patterns in a major way. None expected.

C. HEALTH

1. Altering or destroying a natural environment. Little alteration or destruction is anticipated. Cattle grazing may keep tall grasses down around villages thus destroying the tse-tse fly habitat, but this is already done by the people on a much larger scale by burning during the dry season. The destruction of habitats of other vectors is not anticipated.

2. Eliminating an element in an ecosystem. None is to be eliminated.

H. GENERAL

There are no impacts of overriding national or international concern or interest attached to this project. The project is not part of a larger program which requires an appraisal of environmental impacts.