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Africare

"Improving the quality of life in rural Africa through the development of water resources, increased food production and the delivery of health services."

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ACTIVITES PAYSANNES PHASE II PROPOSAL

DIRE, SIXTH REGION

MALI, WEST AFRICA

Submitted to:
USAID/Mali
Bamako, Mali
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Submitted by:
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Table of Contents

I. INTRODUCTION

Africare, with the assistance of USAID, is presently providing technical, logistical, and administrative support to the Activites Paysannes wheat/rice irrigation project in the Sixth Region of Mali. This project is aimed at assisting two hundred small-scale farmers who are located in drought and famine-stricken areas. The project has made a significant impact during the last year under Africare's management: steps taken to formalize the mechanics training program, improve the credit and cooperative organizations, and assure the timely arrival of inputs (fuel, oil, parts, and seed) have enabled farmers to produce over one thousand tons of wheat on 370 hectares of land. For the 1984-85 agricultural campaign, it is estimated that a total of 1,100 tons of wheat will be harvested. Additionally, by double cropping, the farmers will be able to cultivate roughly 100 hectares of rice.

The project's success in increasing outputs over the last year is evidence of Africare's expertise in developing irrigated agriculture in areas of extreme need. Given this success and the Government of Mali's (GOM) request for continued support, Africare is requesting additional financial assistance from USAID. This support will permit Africare, the GOM, and the farmers sufficient time to train technical and management personnel, organize farmer cooperatives, and undertake agricultural research for the next three years. The total cost of the project is $2.3 million, and the request from USAID is for $1.9 million.

II. PROJECT PURPOSE AND DESCRIPTION

The goal of the project is to promote food self-sufficiency in Mali's drought prone Sixth Region through food increased production and improved management of water and soil resources.

A. Project Purpose

The purpose of three years uninterrupted support for this irrigation activity will be to consolidate the progress made over the past year. It will focus on a) cooperative, mechanic, and agricultural training; b) research and study concerning agriculture and alternative energy options and; c) greater integration and cooperation between the GOM's agricultural extension service (Action Ble) and research station (L'Institute d'Economie Rurale/IER) in Dire, as well as between Le Direction National de la Cooperation and the project.

The project will also continue to reinforce the institutional infrastructure required to meet the needs of pump farmers, thus improving their productivity and reducing their dependence on food aid.

B. Target Group of Beneficiaries

The project is designed to directly benefit between 150-210 pump operators* over the life of the project. This will be

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*As of April 1985, there were 130 pump operators who contracted credit with the project and 30 affiliate pump operators who use project services. For each pump operator, there are four families (including his own) who utilize his pump. Thus the total amount of beneficiaries equals the number of pump operator/owners times four. The figure [illegible]-210 pump operators assumes a mixiumum of 60 additonal new [illegible] to be phased-in over three years.

accomplished through continued farmer support services including the availability of trained mechanics, and a credit fund for fuel, spare parts, motor oil, and fertilizer. Other support will include the use of extension agents to improve the farmers' agricultural methods as well as the replacement of aging project pumps with new equipment.

The mechanics' training program will provide the project with 30 new mechanics, thus bringing the total to 46 in the project area. The project's existing mechanic staff will receive supplemental training when new motors become available and as the pilot alternative energy options are applied.

As part of the cooperative training program, the activity will also provide an adult literacy education program for up to 250 farmers. The training provided in this program will prepare cooperative members to assume responsibility for the management of the cooperative's input delivery system.

The project will provide both short and long-term benefits to the entire Dire community by increasing the fuel storage facilities in the town to 150,000 liters. This increase in fuel storage capacity will be of tremendous help to development projects in the region that are hampered by fuel shortages. In the long run, the establishment of a successful fuel depot in Dire may also attract independent entrepreneurs into the area and encourage them to open additional fuel stations.

The project will also continue to generate data for USAID and GOM. This economic and agricultural information will be available to these and other organizations that plan to undertake development projects in Mali.

The project workshop will be equipped with additonal machinery designed to expand on the present pump repair capacity at the project site, and will continue to offer a valuable service to the comminity. The activity in general will continue to stimulate the local economy. Local and regional businesses will benefit from increased demand for goods and services, while the population as a whole will benefit from improved diets and a dependable supply of food.

C. Description of Project

In an environment under stress from hunger and drought, Africare and USAID have demonstrated that farming families who have access to technical assistance and inputs are prepared to produce and consume the foods they grow. This is a project oriented towards increasing present food production levels by expanding the total number of hectares under cultivation in the region.

The project is designed to help wheat growing farmers efficiently utilize inputs on small irrigated plots. Increased utilization of water resources along with farm inputs are essential if food production is to be increased. Therefore, the project will teach farmers the importance of water management in addition to improved farming methods. The project will also analyze the present motor pump technology and explore possibilities of using alternative sources of energy.

An analysis of data from the most recent harvest revealed that farmers are obtaining yields of up [illegible] tons per hectare. In the past, the average hectare yield [illegible] only two [illegible] tons. And though data sets [illegible] yields are [illegible]

extensive, knowledge of other crops (including vegetables, tobacco and spices) is limited. An important element of the extension, therefore, will be to expand the data base on crop yields.

In general, the project will improve the farmers' irrigations practices; increase the output of wheat, rice, and other crops, and, most importantly, train the farmers in the management practices they need to assume responsibility for all facets of project operations. When these ends are realized, the project will have helped Mali move towards self-sufficiency in food production and, consequently reduced the need for an expensive, inefficient system of international food relief.

D. End of Project Status

At the end of this project there will be:

1. Organized farmer cooperatives.
2. A revolving credit fund and a well established credit system.
3. A well established input delivery system for supplying pumps, spare parts, motor oil, fuel, fertilizer and seed.
4. Functioning motor pump mechanic services.
5. 650-840 farmers engaged in pump irrigation practices.
6. 450-900 hectares producting 2 crops/year.
7. 1,800-3,000 tons of wheat/year.
8. 390-650 tons of rice/year*
9. Comprehensive data collected; agricultural research and alternative energy options explored in the Sixth Region of Mali.

III. PROJECT BACKGROUND

A. History of Project Development

In 1978, USAID Mali began financing the Action Ble Dire Project (688-0213) which was designed as a program of aid to small-scale wheat growing farmers in Mali's Sixth Region. The project included assistance to participating farmers in establishing new irrigation schemes using small motor pumps, a program of credit for financing the irrigation pumps and agricultural inputs, and support of extension services provided by the Action Ble local rural development agency.

Based on Audit Number 688-81-139 dated September 24, 1981, it was decided to discontinue the project as of January, 1981. At that time, USAID Mali proposed a gradual one year "phase out" program of focused, direct support to the wheat-growing farmers who had previously purchased motor pumps under the project. This phase out program, in which Africare participated, has repaired pumps, delivered diesel fuel, trained farmers and mechanics in pump maintenance and repair, provided some spare parts and fuel barrels, and implemented a credit program.

The expression "phase out" implies a gradual discontinuation of operations. In this particular phase out, however, the project moved forward rather than degenerating; the progress made in this one-year "phase out" was encouraging to both farmers and USAID development planners alike. For the first time since the pumps were introduced in 1979, the farmers demonstrated how much they were capable of growing.

It was also discovered that in addition to growing wheat, the farmers were growing rice in significant quantities. Thus, more food in general was produced than expected because the farmers were using their motor pumps year round--even during the rainy season so as to supplement sparce rainfall. As a result, the yields for all crops were higher than they have ever been

Because of the progress during the phase out period, USAID acknowledged the importance of an effective PVO in the management of projects in remote regions such as Mali's Sixth Region.

As a consequence, Africare was requested by USAID/Mali to submit a one-year extension proposal for this project, renamed in 1983, Activites Paysannes. Africare's proposal was approved, and a Cooperative Agreement between USAID and Africare was signed on June 30, 1984.

The Cooperative Agreement authorized Africare to continue the project for one year with $500,000 from July 1, 1984, to June 30, 1985. This one-year extension is now in its final quarter, and the progress to date has been more encouraging than during the previous years. There are six principal reasons why the project, under this Cooperative Agreement, has been successful. The first has to do with complementary relationship between USAID and PVO's as emphasized in the USAID October 1982 PVO Policy Paper. This paper acknowledges that PVO's, because of their heterogeneity and ability to work effectively at the grassroots level, can effectively implement projects that were formerly managed by USAID. As for the Activites Paysannes project, project management under Africare has provided the flexibility needed to closely supervise a project

of this nature, and has eliminated a fundamental cash flow problem that hindered project operations.

The second reason for the project's success stems from the first, and involves the timely delivery of farm inputs and services late arrival of diesel fuel, motor oil, and spare parts often resulted in the loss of numerous hectares. In the past, broken pumps and poor repair work were so prevalent that many farmers had to turn to outside help to save their fields. Africare has made its first priorities the timely arrival of necessary inputs in sufficient quantity and effective pump maintenance and repair. To date, no farmer has reported losses due to the unavailability of fuel or the failure of pumping equipment.

The third reason the project has been successful is improved training for mechanics; the new training has taught the mechanics the proper techniques for pump servicing and repair. Mechanics now understand that repairing pumps entails more than just guessing, and that there are definite procedures one must adhere to. The mechanics are clearly proud of their improved skills, and are far more confident in their work.

Fourth, the linkages between the project and the agricultural research station in Dire have helped lay the groundwork for expansion into areas of mutual interest over the next several years. Closer collaboration with the research station (which is also funded by USAID) has given the project access to the station's applied research on improved crop production techniques that are helpful to the farmers. For the first time, the project and research station have held discussions concerning [illegible] at the farm level. Both have been able to initiate [illegible]

plots focusing on wheat varietal comparisons as well as water and fertilizer field trials.

The new revolving credit fund, the fifth reason for the project's success, is undoubtedly the most crucial component in Activites Paysannes. The original system did not employ sound credit policies, proper accounting procedures, adequate record keeping, and furthermore, was understaffed. When Africare took over there were, in fact, no funds to manage the project. Fortunately, during the Cooperative Agreement year, the (GOM's) Ministry of Interior allowed Activites Paysannes to use $150,000 in PL 480 reflows to keep the activity going. Thus, the credit fund is important because it represents the GOM's direct support to Activites Paysannes.

When given the custodianship of these funds, Africare immediately instituted a new credit system. For the project managers, it has meant a thorough reexamination of the previous credit history, a reorganization of the credit accounting system, the formulation of new credit policies, and many discussions with farmers to emphasize the importance of effective credit and timely repayment. In sum, through the GOM's support, improved credit control, and estimated higher yields for the 1984-85 wheat campaign, the new revolving credit fund is expecting 90-100% repayment this year.

The most important reason for the project's success this past year, however, is the farmers themselves. They have accepted the new credit system, are repaying loans better than they have before, and are receptive to learning more about the new [illegible] pump technology as well as improved agricultural meth[illegible] short, the

atmosphere has greatly improved, setting the stage for the final organization of farmer cooperatives.

The GOM's support for the project and development in this area has increased over the past years. The President of Mali, Lt. Colonel Moussa Traore, visited the Sixth and Seventh regions in December 1983, where he singled out Dire as a pilot zone for economic development. President Traore returned to Dire, on a follow-up trip in October 1984, to encourage the local Dire inhabitants to continue their efforts and reemphasize his support for development in the area. At a conference that took place during this visit, the President promised local Dire authorities his continuous support to the Dire population.

B. Africare's Experience

Africare is a private, non-profit organization established in 1971 to promote rural development in Africa, with an emphasis on water resources, food production, health and refugee assistance. Africare currently supports 80 projects in 15 countries ranging in size from privately-funded well construction projects costing a few thousand dollars to a $5.9 million integrated rural development program funded by USAID in Burkina Faso.

Of all Africare's ongoing projects, 13 are funded by USAID and all are based on grassroots initiative and self-help. Africare representatives are based in ten countries and work with government ministries, authorities, United Nations agencies, the United States Peace Corps, indigenous PVO's, and villagers to identify, plan, and implement rural development projects.

Since its founding, Africare has sought to develop a "constituency for development," particularly among Black Americans. A majority of Africare's 3,000-plus active and life members are Black Americans, Caribbean and African, including its Honorary Chairman, President Kenneth D. Kaunda of Zambia. About two-thirds of its staff are Black or from Third World nations.

Africare secures funding from a broad cross-section of donors in the United States and elsewhere. Private sources of support include church organizations, foundations, corporations, social and fraternal groups, and individuals. (Africare also belongs to the Combined Federal Campaign.) Over the past three fiscal years, through June 30, 1984, private sources have accounted for about 32 percent of Africare's overall support.

Responding to the needs and priorities of a changing continent, Africare has gained considerable experience in drought and refugee-related development assistance, rural enterprise, agribusiness and credit programs. Chief among the latter are the Tara Hydro-Agricultural Project in Niger; the Seguenega Integrated Rural Development Program in Burkina; the Kafue Flats Fishing Program In Zambia; the Binga Fishing Cooperative project in Zimbabwe; a beekeeping program in Zambia; and the Malawi Rural Enterprise and Agribusiness Development Project which Africare will soon undertake with USAID funding. All of these projects have revolving credit funds.

With a regional office in Bamako, Mali since 1974, Africare has undertaken a number of programs of rural development in the Sahel. These programs have been in the areas of famine relief, water resources development, rural health, food production, and integrated rural development.

Africare's permanent representative in Bamako has worked closely with the people and the GOM to establish projects consistent with the aspirations and needs as defined by the government and the people. Accomplished projects include well construction in several regions, construction and furnishing of rural dispensaries and maternities, supplying emergency measles vaccines to GOM's Ministry of Health, vegetable gardens, and an experimental fish production station.

Africare also provided relief assistance in the form of food-stuffs and medicines during and after the 1973 drought. As part of a water resource development/well construction program in the Sahel, Africare assisted in the construction of 16 wells for domestic and animal use in the circles of neighboring Goundam and Timbuktu from 1974 to 1977. Today Africare has development programs in the Segou and Timbuktu Regions of Mali. These programs include: a rural dispensary construction project, construction of approximately 15 wells (three with vegetable gardens), and a Women in Development project.

C. Malian Activities in Project/Program Area

Grain production deficits in most of the Sixth Region have long been a problem. The area around Dire, however, has significant potential for irrigated crop production.

The recent history of efforts to develop the "Plain of Dire" begins in 1921 with the establishment of a large (3-4 hectare), private irrigation system by the French Compagnie Indigene du Coton du Niger (C.I.C.O.N.I.G.) Agricultural production efforts concentrated on cotton, although some peasants were given small, individual plots for wheat production. The C.I.C.O.N.I.G. system failed 25 years later due to a combination of factors including low world market prices for cotton, politics in postwar France, high cost, and increasingly scarce fuel (firewood) for the large, steam-driven irrigation pumps.

In the late 1950s, a group of retired civil servants established the "Cooperative of Dire" and purchased and installed a pump capable of irrigating 150 hectares of wheat land in the former C.I.C.O.N.I.G. perimeter. The cooperative continued to function for 13 years.

In 1962, the Centre d'Animation Rurale, (rural training center at Dire put back into production another small part of the former perimeter on land adjacent to the Center. A Russian-made pump was installed at an existing pump site and operated for approximately six years.

In 1974, the GOM, concerned by the growing need to increase grain shipment to the Sixth Region and faced with large import requirements for cereals, focused its efforts on maximizing grain production in this region. The government was convinced that the development of the "Plain of Dire" could contribute significantly to increased food production for the region. Thus, the GOM's 5-Year Plan (1974-1978) included the "Experimental Perimenter of

Dire" designed for 300 hectares, of which 270 hectares would be distributed to local farmers and 30 reserved for experimentation with wheat, sugar cane, and forage production.[1]

French financial assistance for this pilot perimeter was secured in June of 1975 for the development of the 300 hectare irrigation system, the purchase of pumps, office equipment and supplies, vehicles, housing, and technical assistance.[2] A second tranche of funding (approximately $500,000) was secured when cost overruns threatened the completion of the project. Another major investment in the Dire area is the solar energy powered SOFRETES heat exchange irrigation pump. The Fonds d'Aide de Cooperation (French Government) or FAC also financed the three-volume feasibility study conducted in 1975 by the French firm SCET International The study encompassed the entire Dire Plain (95,000 hectares in all) and examined, in the following priority, the suitability of (1) sugar cane, wheat, and vegetable production; (2) the establishment of a flour and sugar mill; (3) forage production; and (4) a feedlot.

The SCET study did not focus on the potential of small farm irrigation units, but limited its study to the engineering/economic feasibility of the rehabilitation of the large irrigated perimeter. It placed major emphasis on agricultural diversification and related agri-business development. Irrigation, as projected in the SCET study, would be done through the provision or large diesel pumps,

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[1]Plan Quinquennal 1972-1978, "Perimetre Experimental de Dire," August 1974.

[2]FAC project 206/cd/74/VI/B/[illegible] en Valeur de la Plaine de Dire," June 1974.

much as in the manner of the former O.N.C.O.N.I.G. investment. Producers would lease land on a three-year basis from Action Ble.

The SCET study summarizes wheat production potential: "The development of wheat in the study zone should not encounter particular difficulties... and could reach yields in the order of four tons per hectare."[1]

Rural Development Programs, Regions 6, 7, Timbuktu and Gao Regions

The main objective of the project is to use integrated regional efforts to trigger rapid economic growth in both the Lake and Mali Northeast regions.

The secondary objectives can be summarized as follows:

- increase production and productivity of the herd and other natural resources (in grains, animal products, fish, firewood) to the self-sustaining level for both regions
- increase per capita income in the Sixth and Seventh Regions by roughly 13 US dollars during the course of the first five years of the program
- meet local needs more effectively through the creation of centers for sales of local products and for supplies of imported provisions, all of the foregoing to be supported by establishment of the necessary road network.

The accomplishment of these objectives will require:

- effective application of a coherent strategy of regional socioeconomic development
- the creation and management of "Unites d'Exploitation Sylvo-Agro-Pastorales" (UESAP - Forest, Farm and Grazing units--about 150 of them--50 in the lake region and 100 in the Northeast) during the course of the first five years of the program. Given 5,000 tropical livestock units set up by UESAP, close to 46% of the region's herds will thus be affected by the program

[1] SCET, International "Schema d'Amenagement de la Plaine de Dire" Republique d[illegible], 1975, p.77.

- reorganizing the producers to incorporate them effectively into a rational system of production, marketing, and consumption
- the creation of a Joint Rural Development Fund (FCDR) supported by the direct beneficiaries of the project, the GOM, and outside sources of financing
- set up or expand a central clearing-house for coordination and supply of equipment to obviate the anarchy and duplication of effort that have hitherto hampered project completion. This center is called the Rural Development Support Center (CADR)

The Sixth and Seventh Regions cover about 817,980 km^2 and had a combined population of roughly 707,000 in 1978. There are three climate in these regions:

- Sahelian: 300-400 mm annual rainfall
- Subdesert: 50-300 mm annual rainfall
- Desert: less than 50 mm annual rainfall

Although characterized by a low and unequal distribution of rainfall in time and space, this region has enormous potential for forestry, agriculture, and animal husbandry. In effect, the population of cattle and small ruminants was estimated respectively at 1,319,000 and 5,601,000 head in 1980 by the technical services. The cattle in this region account for 23% of the national total, whereas the small ruminants account for about 48%. Furthermore, close to 94% of the camels and 61% of the mules of Mali were located in that region in 1980. The region offers the finest seasonal grazing for the migratory herds of many cattle growers from Mopti, and from certain bordering countries during a large part of the year.

Significant human, material, and financial resources have been mobilized through projects during the course of the last two decades with a view to increase production and productivity

forestry, agriculture, and livestock activities as well as to improve the living conditions of the population. The results obtained were often disappointing for the following reasons:

- poor matches between project goals and those of the direct beneficiaries, resulting from a long-standing habit of planning "from the top down."

- the absence of the environment essential to get the participation--especially financial participation--of the direct beneficiaries in execution of the projects

- the multiplicity of interventions, often without any lasting effect, and the lack of coordination of activities between projects of the same nature in the same area

- the forms and terms of financing project activities, the complexity of the financial disbursements, and the poor efficiency of certain national and expatriate staff attached to the projects

- errors in the project management

IV. ECONOMIC ANALYSIS

A. Economic Effects of Project

1. Introduction

Recent experience in the project zone confirms that cereals production can be an increasingly profitable endeavor. To begin with, the climate and soils are suited to cereal production. Wheat has been a popular crop for centuries and the local population, especially in the Bourem sector, have a wealth of experience in wheat cultivation. Rice, millet, and sorghum are grown during the rainy season with rice being the preferred grain crop. Floating rice is a traditional rice crop in the area and is preferred by many. Paddy rice cultivation is spreading as many of the soils near the river are heavy enough to retain water adequately for rice production. Millet and sorghum are produced by a significant group of farmers who prefer them because of economy and adaptability to diverse soil types.

These grains are largely withheld for home consumption though most producers will sell a certain amount to obtain other necessities as needed. An interesting situation in the area is that the cash needs of farm families are being satisfied to a greater degree with spice (anise and cumin) production. Spice is a high value crop that has attracted the attention of many farmers over recent years.

At the beginning of the season, the project area under cultivation during the wheat producing season was 430 hectares.

Roughly 60 hectares are in crops other than wheat, with the bulk being in the two types of spice. The average area cultivated per pump during the 1984-85 season was 3.4 hectares, and the mean yield of wheat is estimated at 3.2 tons per hectare. This project plans to:

(a) increase the area under cultivation.

(b) improve average yields by introducing higher yielding seed on an experimental basis and encouraging use of fertilizer as results from agronomic trials become available for extension.

(c) attempt a reduction in production costs by improving pump maintenance, modifying water application methods, and reducing fuel consumption by using timely periods of water application.

(d) assist the GOM with the establishment of village-level farmer cooperatives, and train its members to manage the coops' affairs, including credit and inventory management.

(e) further equip an existing repair shop to improve and broaden repair capabilities.

(f) train approximately 30 additional mechanics to perform pump repairs.

(g) continue agronomic research and data gathering on soils and water management, tillage practices, and alternative pumping sources.

(h) begin to provide replacement pumps (see next section).

2. Direct Benefits of the Project

The target group of beneficiaries are the existing 130 pump owners* plus an additional 60 new participants who will

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*There were 130 owners at [illegible]inning of the wheat campaign. By April 1985, the numbe[illegible]n to 157. See [illegible]n B for an explanation of pump r[illegible]

receive pumps during the life of the project. This group will directly benefit from the project's existence due to:

(a) the possibility to produce more wheat, millet, rice, sorghum, spice and vegetables in a more reliable and efficient manner.

(b) the literacy education and formal management training obtained through the coop structure.

(c) acquired self-reliance in managing and administering production credit and procurement.

3. Indirect Benefits of the Project

The existence of the project will increase benefits to related groups in the area by providing increased employment opportunities to young people and non-pump owners. The local economy will benefit from the increased volume of production as larger volumes of cash products reach the market. The increase in the number of mechanics will benefit the owners of diesel powered equipment be it water pumps, electric generators, or vehicles. The existence of an equipped garage will provide an alternative source for general repairs of equipment of all types: motorcycles, mopeds, bicycles, mule carts, vehicles and agricultural machinery. This may encourage the expansion of mechanical devices such as motor pumps and other implements if public access is available. Commercial linkages could also develop that would supply these items and spare parts if service and repair was relatively certain. Alternative pumping sources, if proven viable, will attract the interest of farmers outside the project.

4. Potential for Reaching Large Numbers of People

There is a substantial potential for expanding the range of the project without prohibitive expense. Assuming that the cooperative development plan succeeds, other interested villages and groups would have a precedent to emulate. Given the desperate nature of the food supply situation and the lack of alternative income sources, it is not unreasonable to expect the project's stimulation of cooperative formation to be a catalyst that could multiply initiative and desire in the remainder of the local population, for specific action in alleviating their plight.

5. Pricing and Marketing

Modifications in GOM's grain pricing and marketing policy, undertaken in 1983, provide more incentives to rural farmers. Formerly, the agency responsible for grain marketing and purchasing, OPAM (Office des Produits Agricole du Mali) had a monopoly on domestic cereals marketing at all levels. Official prices to wheat growers were unrealistically low when compared to both world prices and local prices in Diré. In 1978, for example, the official price for wheat was 31,000 CFA francs/metric ton (MT); in the Diré market prices were on the order of 100,000 CFA francs/MT.

Due to significant multilateral pressure the GOM abandoned this policy and switched to a free market system where prices are determined by market forces of supply and

Private concerns have also been allowed into the market to replace the monopoly formerly held by OPAM, thus rendering the marketing and pricing mechanism more competitive. Wheat prices in Diré in mid-1984 reached 136,000 CFA/MT. In March and April of 1985 asking prices in Diré jumped to 212,000 CFA/MT. (See Annex II of Section B for wheat prices.)

Sorghum, millet and rice producers also benefit from these policy changes. However, yields and prices for these products are typically lower (See Annex II for these prices.) With the cereals deficit ever-present and increasing in the Sixth and Seventh Regions, one can expect that farmers will attempt to produce their maximum in order to satisfy their personal needs and endeavor to reap some cash benefit due to price incentives.

6. Agricultural Credit

The heart of the project's support to farmers is the revolving credit fund. To date a majority of farmers accomplish the bulk of their production with a significant amount of credit given in kind, i.e., fuel, motor oil and spare parts. There is no formal alternative credit source available to farmers in the area for these crop production items. What informal loans are available are provided by local businessmen, and it is unlikely that they could handle the quantity of inputs needed without heavy outside financing.

Without the revolving credit fund, most farmers would be forced to sharply reduce the area they cultivate and some would have to abandon it altogether. Currently the farmers are not in a position to assume credit management. Thus without the project there is a high likelihood that credit availability would rapidly decline. A major benefit of the project is credit availability and the related responsibilities of respecting credit engagements that farmers are slowly learning are necessary to gain access to essential inputs. This is especially true in regard to long-term credit that allows farmers to obtain capital equipment--in this case, the motor pump. The high initial investment required to obtain such equipment is beyond the means of all but the wealthiest of farmers. If long-term credit is not available it is questionable whether a significant number of farmers will be able to renew their pumping equipment when it's useful life has expired. This also would gradually curtail irrigation of this type if no alternative credit sources are available.

B. Financial Analysis

1. Methodology

The approach to the financial analysis is the following sequence. The purpose is to set up a framework which can be a basis for future data collection and analysis.

Step I--Overall descriptions of project farmers were constructed on the basis of interviews with project staff.

Step II--Price levels for inputs and outputs were determined

Step III--Quantities of inputs and outputs were determined through interviews with farmers, project records and consultation with project staff. Crop budgets were constructed both for specific farmers and, to the degree possible, using averages and estimates to estimate a simple model representative of costs, benefits and average net benefit per hectare of major crops.

Step IV--Crop budgets were sythesized into farm budgets on the basis of the typology constructed in Step I and the budgets per crop in Step III. These are compared with one of the currently most successful farms for which relatively complete information was available. Cash position to pay for pump financing in the current year is estimated, including rough estimates of grain consumption.

Step V*--Purchase costs of several pumps are presented. Farmer financing scenarios are suggested.

Step VI*--Scenarios for increased farmer production with the old Cooper pump are projected. The same is done for investment in a new pump. Financial rate of return (IRR) are calculated for both (Annex VI).

Step VII--A project aggregation based on the cases in Step VI is attempted. Project revenues are presented and the question of which project costs could be covered (and therefore, in theory, run by the farmers without outside subsidy) is discussed. An economic analysis (as opposed to financial) of the project as a whole.

Step VIII--A narrative listing of conditions necessary for project continuation and success is the final step.

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*Steps VI and VII were only begun in this brief visit. Annex VII explains why it was not currently possible to complete these steps.

Step I: Estimate as to Dry Season Cropping Activities of Farmers Within Project

Basic assumptions on which total analysis is based

The average area per pump is 3.4 hectares, according to measurements taken by D. Jackson this season. There is considerable variation, however. It is also usually the case that more than one farm family is using one and an average of four families per pump (i.e., .85 hectares/family) was suggested as reasonable. However, although boundaries and size of fields may now be understood by project staff, the same is not true of boundaries and size of families. It appears that most pump groups may be extended families, but project staff say that there is a great variation among situations and neither definitive statements nor good estimates are available at the moment. Current pump owners are considered the "farmers" of all land irrigated by their pumps for this analysis, since, as far as their dealings with the project are concerned, this is realistic. Availability of labor, distribution of benefits and family consumption needs may vary greatly and will affect farmers' performance, income and ability to finance both current debt and pump replacement.

Due to the complex history of this project, there are substantial gaps in information. The first step in the analysis was to quantify more accurately the whereabouts and use of project pumps. Seven "types" of situations were identified (see Annex I). Types I-III are current, active project farmers.

Types IV and V have "graduated" from the project in that they are using pumps which came originally from the project, but they do not use project services (credits and supply of inputs and repairs) directly. In that they are able to support themselves without p[illegible] help, they are a demonstration that the concept can be a [illegible]ess. Since Cooper pumps were and pump parts are only available through the project, it is highly likely that there is some resale of parts and possibly gas and oil (available commercially at slightly higher prices, probably intermittently). This may be considered an irritation by project staff, but is also an uncounted benefit of the project.

Types VI and VII are not well identified. Type VI have left the project area taking their pumps and VII are wheat or wheat and spice growing farmers who are in the area but not in the project for various reasons. This last group supplied the 27 farmers who joined the project during the past wheat campaign to make (130 + 27 =) 157 currently active project farmers. They joined in two broad ways:

(1) They started a crop on their own, ineligible for project credit due to outstanding debts from previous years. They, in effect, refinanced by paying off a good section of the outstanding debt during the season to obtain credit and inputs. Project staff went out to observe their fields before refinancing.

(2) Farmers who came into the project by completely paying off the debt (theirs or someone else's) on a pump to rejoin.

The project farmers are identified as Types I-III according to their relative cropping mixes. This is shown in Annex I, Table 2.

Information about farmers' activities during the rainy season campaign is less complete at this point. The Africare staff took over management of this project during the last rainy season campaign. At that time there were more urgent matters than measuring fields and calculating all yields.

There is no obvious correlation between the three types of dry season farmers listed in Table 2 and their rainy season crop choices. Generally, rice is the preferred crop. Much of it is grown in the "mares," lowlands which are flooded as the river rises after the rains up river begin. Floating rice is planted when these low areas are first dampened and as the water level rises through the season, the stems of floating rice elongate. Harvest is done by boat.

Traditionally, floating rice was grown with no supplemental irrigation. Now, with the failing rains, the river does not always rise in time to start the rice planting and farmers often bring their pumps to the mares to flood them for planting. They continue to irrigate until the river rises sufficiently. These few beginning irrigations are essential to make the crop possible for most rice farmers. It seems that the area in floating rice is limited by the availability of suitable land, and how access to land has been determined is not known. Some farmers grow upland rice and irrigate with the pumps.

ANNEX I

TABLE 1
ESTIMATION OF WHEREABOUTS AND CURRENT USE
OF PUMPS (250) ORIGINALLY DISTRIBUTED
BY PROJECT*

157 Active Project Farmers as of 4/27/85	157 Types I-III Wheat & Spice growers (See Annex I Table 2	Active with project as of 4/27/85 at beginning of season the others have joined since, either by completely paying off an old outstanding debt--their own or someone else's--or by starting a crop on private means or credit and then obtaining entry to the project during the season by partially recouping old debt and on strength of current crop.
Approximately 70 pump owners can be considered to have graduated from the project since they continue to farm with pumps and without further project assistance	30-40 Type IV Vegetable Elite	Vegetable farmers in Diré who are relatively well-to-do, generally hire most labor and use commercial sources, not project--officials, schoolteachers, religious leaders, etc.
	30-50 Type V Tobacco Farmers	Tobacco farmers across the river who do not use project.
23 (?) Current productivity Unknown	20-40 Type VI Migrators	Moved outside project area, taking pump.
	Few Type VII	Farming wheat or wheat and spice in project area, but not using project possibly because they are relying on other resources, have bad credit, are farming too far away from atalier to get in easily, or are renting out their pumps to others. This group provided the increase from 130 to 157 in active category Types I-III above
250 Total**		

*SOURCE: [illegible], Interview, 4/85.
**Compare [illegible]

ANNEX I

TABLE 2
ESTIMATE OF DRY SEASON CROPPING ACTIVITIES
OF FARMERS CURRENTLY ACTIVE MEMBERS
OF ACTIVITES PAYSANNES*

Type I Farmers: Solid Wheat

3.2	ha	Wheat	Approximately
.2	ha	Vegetables**	85 Farmers (55%)
3.4	ha		

Type II Farmers: Traditional Spice Growers

1.6	ha	Wheat	Approximately
1.6	ha	Spice	20 Farmers (13%)
.2	ha	Vegetables**	
3.4	ha		

Type III Farmers: Experimenters, Gradually Growing Less Wheat and More Spice

2.0	ha	Wheat	Approximately
1.2	ha	Spice	50 Farmers (32%)
.2	ha	Vegetables**	
3.4	ha		

*SOURCE: D. Jackson. Interview. 4/85.

**Vegetables grown include onions, tomatoes, squash, melons, tobacco, melons, tobacco (grown in with vegetables), cabbage and lettuce, grown by virtually all farmers. Onions are a frequent cash crop, sold either fresh or cut, partially dried and formed into a ball or dried and mixed with peppers, etc. as a flavoring (womens' processing activities and sale). Peppers, green beans, black-eyed peas, beets, carrots and potatoes are more likely to be found in the gardens of "vegetable elite" growers (Type IV. See Annex I, Table 1.

ANNEX I

TABLE 3
ESTIMATE OF RAINY SEASON ACTIVITIES OF FARMERS
CURRENTLY ACTIVE MEMBERS OF ACTIVITES PAYSANNES

157	farmers in A.P. currently preparing for upcoming rainy season campaign.
40%,	approximately, will plant floating rice in mares, and/or grow some upland rice. All suitable mares will be used. Total area unknown at present. Field size = size of mare: variable. These farmers may also plant millet and sorghum
60%,	approximately, will plant millet and/or sorghum but no rice. Area per farmer (pump) planted in these crops appears to be less than wheat area. Project staff intends to investigate why this is so and to encourage planting larger areas if possible. Some farmers complained of falling soil fertility, including one who uses both manure and chemical fertilizer on these crops. This needs to be investigated, as does the economic profitability of these crops.

Millet and sorghum ("petit mil" and "gros mil") are referred to as if they were one crop for describing growing practices, although farmers do make distinctions about harvesting and threshing techniques. Both are grown in the area although project [illegible] saw very little sorghum last year. A number of farmers [illegible] when I asked, that it was not possible to grow sorghum on the soils they had. Further research into this season's crops is necessary, although preliminary crop budgets are included here. (See Annex I Table 3 and Annex III.)

Step 2: Production Inputs and Outputs, Quantities and Prices

Most farmers stated that the first year land was cultivated, it produced a good crop of grain with no fertilizer at all. In subsequent years, both manure and soil from other fields were generally used. Children and sometimes adults gather animal manures to spread on the fields. This is all done with family labor, it seems. One farmer stated that 10 baskets of manure per small irrigation basin (few m^2) was the proper quantity, suggesting that at leat some farmers keep track of this, and measurement might be possible.

Chemical fertilizer is not widely used, but I discovered two farmers who had used it among the handfull I was able to interview in my very few days at Dire. Both had used chemical fertilizer in an attempt to save crops and/or boost falling yields. One farmer stated that after his wheat crop

germinated, he saw that it was going to make a very poor stand. With some trouble, he located a source for fertilizer and bought a 100 kg. sack of urea for 12,000 CFA. He spread it on one hectare of wheat and got a yield of two tons. He said, he thought it would have been none at all without the fertilizer. The second farmer used some chemical fertilizer on his millet/sorghum crop in an attempt to boost falling yields. He gave fertilizer prices at action Blé for the past years (seasons) as:

12,500	per 100 kg sack
20,000	per 100 kg sack
25,000	per 100 kg sack

He said that he had heard that fertilizer prices had risen again, but had not gone to find out the new price as he wouldn't buy it at a higher price.

When asked whether natural or chemical fertilizers were better, he said that the chemical gave faster results and was better that year, but that manure was longer lasting, giving better results on the second crop (this is quite consistent with agronomic principles), and so using both was good.

My opinion is that increased use of chemical fertilizers in addition to the available organics will be an important improvement. Results from research at the nearby agronomic research station are unfortunately not yet at a stage where they can be disseminated. Collaborative work should be encouraged, as well as fertilizer sale through the project if and when the capabilities exist. Project staff [illegible]

Production Inputs

Seed*

Farmers both save their own seed and purchase it (wheat: "Tetra" seed and spice for seed) from the project and possibly elsewhere (Action Blé seed was said to be of inferior quality). The project staff have made an effort to select the better wheat for resale as seed, and they sell the rest for consumption.

The project source for seed is the wheat and spice that the farmers sell to the project at harvest to pay off their credit.

The project bought wheat a year ago (end of '83-'84 campaign) for:[1]

FM/SAWAL	=	CFA/SAWAL	=	CFA/KG	=	$/MT
900		450		136		302

and sold, for consumption, at:

950		475		144		320

and sold selected seed for planting at:

		500		152		338

[1]If 450 CFA = $1.00

*SOURCE: M. Short. Interview. 4/85, Bourem.

The project is currently buying spices slightly below market price (i.e., 325 rather than 350 per pot [300 g]). They do not wish to take in more than they can resell as seed.

ANNEX II

TABLE 1
AVERAGE EXPENDITURE ON INPUTS SUPPLIED
BY A.P. DURING 1984-85 WHEAT CAMPAIGN*

All Crops

Farmers	45
Total Hectares	161.75
Average Hectare	3.59

	Average Per Hectare	
Gas oil	30,597	@ 230 CFA/l
Oil	4,907	@ 775 CFA/l
Parts	20,291	
Interest	2,220	@ 1% per month
Seeds	2,186	@ 144 CFA/kg
Redevance (dues for mechanics' salaries	5,645	@ CFA 15,000 for 1st 2.5 ha & CFA 3,750 per additional ha.
	65,844	

Wheat Farmers Only

Farmers	20
Total Hectares	69.36
Average Hectare	3.47

	Average Per Hectare
Gas oil	31,374
Oil	5,066
Parts	23,693
Interest	2,283
Seeds	1,608
Redevance	5,864
	69,885

*SOURCE: A.P. records as of 5/1/85. Figures include credit and cash purchases. Compiled by E. Washington, at Bourem.

ANNEX II

TABLE 2
ESTIMATED TOTAL
ANNUAL LABOR SCHEDULE
WHEAT AND MILLET
Person days/hectare**

	J	J	A	S	O		D	J	F	M
Land Prep-Forming Plots	9					9				
Maintenance of Canals	8					8				
Planting	6					4				
Irrigating*	3	4.5	4.5	4.5	1.5	3	6	6	3	
Fertilizing										
Weeding	4	6	6	4		5	7	7	4	
Guarding/ Bird Control	15	30	30	90	45	15	30	30	60	45
Harvesting					7					30
Threshing					15					25
Transport					1.5					2
	45	40.5	40.5	98.5	70	44	43	43	67	102

Millet, 295 person days | Wheat, 299 person days

*1.5 person days per irrigation.

Millet 120 day variety irrigated every 10 days, total of 12 irrigations. First irrigation June 15.

Wheat 104 day variety irrigated every 5 days, total of 20 irrigations First irrigation November 15.

**SOURCE: D. Jackson. Modified Version of deRafols' estimates.

ANNEX II

TABLE 3
ESTIMATED TOTAL ANNUAL LABOR SCHEDULE
WHEAT AND RICE
Person days/hectare**

	J	J	A	S	O	N	D	J	F	M
Land Prep-Forming Plots	13					9				
Maintenance of Canals	5					8				
Planting	7					4				
Irrigating*	15	13	13	13		3	6	6	3	
Fertilizing										
Weeding	3	5	5	2		5	7	7	4	
Guarding/ Bird Control	30	30	30	60	30	15	30	30	60	45
Harvesting					27					30
Threshing					19					25
Transport					2					2
	73	48	48	75	78	][44	43	43	67	102

Rice, 322 person days][Wheat, 299 person days

*1.5 person days per irrigation.

Millet 120 day variety irrigated every 3 days, total of 36 irrigations. 120/3-4 irrigations at season's end.

Wheat 104 day variety irrigated every 5 days, total of 20 irrigations. First irrigation November 15.

**SOURCE: D. Jackson. Modified Version of deRafols' estimates.

ANNEX II

TABLE 4
HIRED LABOR--WHEAT
Number of Days Per Hectare

	#1	#2	#3	DJ	CGH*
Turning Soil	20	20	5[illegible]		15
Making Irrig. Basins			[illegible]		5
Levelling			28		10
Fertilizing					
Seeding			9		
Irrig. Maintain Canals					
Weeding					
Harvesting	24	24	11		20
Threshing	60	42	60(?)**		40
Guarding/Bird Control					
Transport					
TOTAL	104	86	174	16	90

*#1, #2 and #3 are farmers interviewed. DJ is project staff estimate. CGH is consultant's estimate of averages to be used later in model.

**Farmer said that this included both those hired to thresh and some "voluntary" labor, persons who worked and then accepted what they were offered in payment and that this number was extremely difficult to determine. He did know the net amount of his harvest after paying the threshers in kind.

OUTPUT PRICES

ANNEX II

TABLE 5
WHEAT PRICES

Source	Time	Local Pricing CFA/SAWAL	Local Pricing CFA/KG	Equivalent $/MTON @ CFA 450 = $1
Diré Market*	Dec '84	500	152	$ 337
	Dec '84	550	167	370
	Jan '85	625	189	421
	Feb '85	625	189	421
	Mar '85	650	197	438
	Mar 18-28	700	212	471
	Mid-April	625	189	421
	4/23/85	700	212	471
Timbouctou	4/27/85	None in sight in Market. Prices rumored to be high.		
Used in analysis:		600	182	404
Activités Paysanne**				
	Spring '84, Debt Recoup Price	450	136	303
	Late Sum '84 Selling Price (for consumption)	475	144	320
	10/84-11/84 Selling for Seed (Selected)	500	152	337
	Spring '85, Debt Recoup Price	575	174	387

*SOURCE: Umar, Bourem.
**SOURCE: M. Short, Bourem.

OUTPUT PRICES

ANNEX II

TABLE 6
RICE PRICES
(Over Time)*

Source	Time	Local Pricing CFA/Pot	Local Pricing CFA/kg	Equipment $/MTON @ CFA 450 = $1
		CFA		
Diré Market	Dec '84	200	200	$ 444
	Jan-Mar	190	190	422
	April	225	225	500
OPAM Official Price (to Officials)		125	125	278

VARIATIONS IN RICE PRICE BY QUALITY
Diré Prices as of 4/85**

Type			
"CFA Timbouctou" (Maybe also Office du Niger?)	300	300	667
Chinese Import	250	250	555
Riz Flotant, Local	225	225	500
Local Non-Floating Type Rice	200	200	444
Malasian Donation (Considered too old)	125	125	278

*SOURCE: Umar. Market Observations. Carefully recorded.
**SOURCE: Mechanics, group Conversation. General knowledge, but possibly not accurate.

Step III: Crop Budgets

In the following sections, crop budgets for specific farmers are reproduced based on their responses to questions when interviewed. This sample is too small to be taken as representative of the situation of all farmers in the project, but the budgets are more detailed than those listed in previous reports and clarify some issues such as when labor is hired. These budgets (Annex III, Tables 1-8) are synthesized in Annex III Tables 9-11, and compared with other data where available (project staff models, atalier cost records) and used to project a tentative generalized model.

It should be noted that up until the last step, all numbers presented have been collected data. This last step of creating a synthetic "average" net benefit per hectare will be useful in looking at project costs and benefits. As mentioned above, this sample size is very small, although comparison between the farmers' accounts of their cropping costs and atalier cost records and between different farmers' descriptions suggest that we are generating "ball park" figures.

This methodology is presented in detail partly because the project could and should continue to collect such information in the future to improve upon understanding and analysis of the farmers' physical and financial productivity.

The individual farmers' situations vary considerably and the differences are reflected in Annex III, Tables 10-12, particularly in Table 10, the wheat budgets, for which there most complete information.

Farmer #1 originally was co-owner of a pump with his brother, but he had left the area for a while and his brother used the pump to farm, but had accumulated debt and was not eligible for credit. The account was considered dead in project records. When Farmer #1 came into the project offices in Bourem, it was to pay off the old debt of 42,500 CFA, take full responsibility for the pump, and become eligible for credit in the upcoming rainy season campaign. He said that he had gotten the pump fixed and bought diesel and oil commercially to produce wheat and spices on 2 hectare, using the proceeds to pay off the debt to the project (and his commercial credit?). He planned to farm with two others next season--two hectares himself, and one each for the other two--all on his pump. His case suggests that wheat and spice farming can be reasonably lucrative. He paid a lot in parts and repairs to get the pump going (bringing up the question of sources of Cooper parts again) and to re-establish credit with the project. He had not farmed during the previous rainy season.

Farmer #2 was an active member of the project. He grew two hectares of wheat and a small area (unmeasured) of spices which yielded him 140 po (47 kg). He grew only one hectare of millet in the rainy season.

Both farmers #1 and #2 may be "average" farmers in some ways, but both farmed on smaller areas than the project average (3.4 hectares) and got lower wheat yields (2.4 tons/hectare and

2.3 tons/hectare) than the average yields as measured by project staff (3.2 tons/hectare), suggesting that they are certainly not above average. Using their figures, the net benefit per hectare of wheat would be close to 300,000 CFA.

Farmer #3 is one of the best farmers in the project, from the project staff's point of view. He is generally the first to pay back his credit, and he brings in his pump for preventative maintenance and repairs after every "campaign" (i.e., twice a year). At the time of my visit, the wheat harvest had been finished barely a week. He had payed off his debt, mostly in cash, had already had his pump rebuilt for the coming season, and was profiting from the break in farming to go to town (Bamako) to see both about some spices and onions he had left with a merchant to sell on a previous visit and to take in some locally made mats to sell.

When I interviewed him, Farmer #3 seemed hesitant at first, but grew animated as the interview continued, and I asked him for detailed information about his agricultural methods and which tasks were performed by paid labor and which by his family.

It seems to me that, overall, his success is based on a combination of capitalizing on some economies of scale with the pump, on his own hard work and entrepreneurial skills, on availability of family labor, and possibly on good political influence. He farms seven hectares in the main dry season, all of it irrigated. His pump is stressed beyond its rating,

according to project staff, although the fact that he is so fastidious about maintenance has kept it going. He calls upon his extended family for some labor--and shares a considerable amount of the harvest with them at the end, although he does not pay them as he pays hired labor.

In the wet season, he moves his pump to a different location where he says it is possible to farm millet and sorghum. He also grows floating rice and upland rice, and for the latter, he uses a neighbor's pump to irrigate, under an agreement whereby he supplies the diesel fuel. He plants the wheat and other cool season crops in a new seven-hectare piece of land every year, but continues to use the same four hectares for millet and sorghum, now for the third year, despite the fact that his yields have gone down considerably for these crops, even though he used manure and some chemical fertilizer this year. In general, his yields do not seem to be particularly high but his overall farm management seems good.

His descriptions of his cropping operations were very detailed, and his recall of the number of days to perform various tasks, the numbers of people involved, the number of pots of spice or kilos of onions in the bags sent to town, and their prices, was extensive, although there were a few figures he could not produce.

Overall, he was an excellent informant, but more interviews are needed to discover how representative his crop yields are. His yields, as mentioned above, do not appear to

be higher than average. His pump costs per hectare are lower than average as the costs are spread over seven hectares. He hires more labor than other farmers, and he works full time, beside the hired labor. He gave figures for the number of man-days required per task as ranges (e.g., 5-7 people) depending on whether the workers were skilled or not. When I asked him if it was possible to pay the better workers more than the poor ones, he laughed and said no, but by working with them he saw who worked harder and rehired those individuals.

All three farmers were getting respectable net benefit/ha compared to their costs. The returns for farm family labor appear to be in the range of the going labor day's wage of 1000 CFA/day for wheat, considerably higher, perhaps double for spices. Upland rice may give returns to labor three quarters the daily wage (or $50) and perhaps half (500 CFA/day) for millet and sorghum. This might help to explain why farmers tend to grow smaller areas of millet and sorghum than of wheat, despite the lower water requirements. Total labor requirement for all crops, especially rainy season crops would need further study to make these figures more precise.

DRY, COOL SEASON CROP

ANNEX III

TABLE 1
WHEAT: FARMER #1

Costs

		CFA/Hectare
Hired Labor:		
Prepare fields	20 people, 1 day/ha @ 500 CFA	10,000
Harvest	20 people, 1 day/ha @ 1 Sawal (3.3 kg) @ 600 CFA/Sawal	12,000
Threshing	10 people, 5 days/ha @ 1 Sawal (3.3 kg) @ 600 CFA/Sawal	30,000
		52,000
Pumps:		
Gasoil	220 l/ha @ 250 CFA/l (in Diré, commercial)	55,000
Oil	3 bidon (4 l/bidon) @ 3120 CFA/bidon (In Diré, commercial = 780 CFA/l)	9,360
Parts	37,500 CFA	37,500
		101,860
Total Costs		153,860
Benefits	740 Sawal/ha @ 600 CFA per Sawal (=2442 kg/ha)	444,000
Net Benefit/Hectare		290,140

Return to Family Labor

300 days/ha = 967 CFA/day (remarkably close to the actual labor wage paid.)

210 days/ha (300 total days estimated by D. Jackson [Annex II Table 2 and 3] - 90 days paid labor listed above) = 1382 CFA/day.

Dry, Cool Season Crop

ANNEX III

TABLE 2
WHEAT: FARMER #2

		CFA	
		2 ha	1 ha
Costs			
Labor	20 people, 2 days, 1 ha/day = 40 people, 20 people/ha @ 500 CFA	20,000	10,000
Harvest	20 people, 2 days, 1 ha/day 1 Sawal/person @ 600/Sawal (3.3 kg)	24,000	12,000
Threshing	10 people, 7 days, 1 Sawal/ person @ 600/Sawal	42,000	21,000
	Total Labor	86,000	43,000
Water			
Gasoil	2 barrels @ 200 l/barrel commercially @ 250 CFA/l	100,000	50,000
Oil	2 bidons @ 4 l/bidon plus 2 l = 6 l @ 3120 CFA/bidon	7,800	3,900
Parts	(Estimated)	50,000	25,000
Redevance	15,000/farmer for up to 2.5 hectares	15,000	7,500
	Total Inputs	172,800	86,400
	Total Costs	258,800	129,400
Benefits	4.5 tons wheat @ 600/Sawal (= 181,818/ton)	818,181	409,090
	Net Benefit/hectare	559,381	279,690

Return to Family Labor
300 days/ha = 932 CFA/day
225 days/ha = 1243 CFA/day

Dry, Cool Season Crop

ANNEX III

TABLE 3
WHEAT: FARMER #3

4 hectares tetra
.5 hectares barley, intercropped with some onions. Barley was considered like wheat by farmer and counted together for a total area of 4.5 hectares.

		CFA/Hectare
Costs		
Labor	Turning land @ 500 CFA (20 people 20 days/7 ha = 57.15 peo. days/ha	28,571
	Making "planches" @ 500 CFA (8 peo. 7 days/7 ha = 8 days/ha)	4,000
	Leveling soil (4 peo., 7 days/ha)	14,000
	Seeding (8 peo., 8 days/7 ha)	4,571
	Harvest 40 Sawals total paid @ 600 CFA per Sawal (3.3 kg) divided by 4.5 ha	5,333
	Threshing 15 Sawals/person/20 days @ 600 CFA/Sawal plus other "volunteers"	1
		56,475
Inputs	2 bags tetra seed @ 12,000 plus seed he saved, 4 bags/5 ha	5,333
	Gasoil	25,480
	Parts	11,110
	Oil	2,685
	Redevance/labor	4,820
	Interest	1,215
		50,643
	Total Cost/Hectare	107,118
Benefits	8 tons @ 600 CFA/Sawal divided by 4.5 hectares(2)	323,232
Net Benefit per Hectare		216,114

Return to Family Labor
300 days/ha = 720 CFA/ha
248 days/ha = 871 CFA/ha

1 Farmer did not [illegible] total amount of grain he paid to threshers. He gave [illegible] yield net of payment to threshers, however.

Dry, Cool Season Crop

ANNEX III

TABLE 4
ANISE AND CUMIN: FARMER #1

Benefits		1/2 Ha	1 Ha
1/2 hectare, 5 sacks of spices (65 kg/ sack, 300 g/pot @ 350 CFA/pot (Diré)		375,375	750,750
Costs			
Labor	Soil preparation, 10 1 day @ 1000 CFA	10,000	20,000
	Seeding, 5 peo., 2 days @ 1000 CFA	10,000	10,000
	Weeding, 5 peo., 3 days @ 1000 CFA	15,000	15,000
	Harvet, all family, 7 people harvest 1 day at a time		-0-
	Subtotal		45,000
Fuel and oil	Same as Wheat[1]		
	Total		101,860
Total Costs per Hectare			146,860
Net Benefit per Hectare			603,890

[1]Spice is irrigated one time before wheat is planted and twice after wheat is harvested. However, wheat is irrigated twice as often as spices--early in season until spices are in flower. Total irrigation: Wheat, 13 times; Spices, 12 times.

Return to Family Labor is difficult to estimate as total labor for the crop is not known. If spice takes the same labor as wheat or 300 person days/ha minus the 35 days of paid labor listed above, returns would be 2279 per day (very high). Total Family Labor days could go up to 600/ha and still have returns to labor > 1000 CFA/day.

Dry, Cool Season Crop

ANNEX III

TABLE 5
ANISE AND CUMIN: FARMER #3

		CFA	
		2 ha	1 ha
Costs			
Labor	Making planches, 8 peo., 2 days @ 500 CFA	8,000	4,000
	Seeding, 10 peo., 10 days @ 1 sawal/day @ 600 sawal (3.3 kg)	60,000	30,000
Inputs	Water, same per hectare as for wheat		44,095
Interest			1,215
Total Cost Per Hectare			79,310
Benefits			
	28 sacks anise, 180 pots/ sack @ 325/pot (Diré)	1,638,000	819,100
	1 sack anise, 225 pots/ sack @ 600/pot (Bamako)	135,000	67,500
	1 sack cumin, 180 pot/sack @ 400/pot (Diré)	63,000	31,500
	- 9,000 estimated travel costs		
			886,600
Net Benefit/hectare			807,290

Return to Family Labor - over 2000 CFA/day if number of days worked/ha is less than 400.

Dry, Cool Season Crop

ANNEX III

TABLE 6
ONIONS: FARMER #3
(1/2 Ha. onions intercropped with barley)

Benefits

10 Sacks:

5 sacks kept for home consumption (2 sacks 125 kg) Valued at 100 CFA/kg	31,250
1 sack at Diré @ 100 CFA/kg, 50 kg	5,000
4 sacks @ Bamako (125 kg, 155 kg, 155 kg, 165 kg = 600 kg @ 110 CFA/kg)	66,000
	102,250

Costs

Not known. Onions are grown mixed with the barley (called a wheat variety) by farmer #3. Exactly how is not known, since the harvest was complete and it was not possible to see the crops in the field. Labor requirements were presumably different than for the wheat, but water would be the same.

Net Benefit Per Hectare

Not known. Hard to determine yield per hectare accurately with mixed crop. Farmer was extremely pleased with onion income, which he seemed to consider almost costless, as soil preparation, etc. was done in any case for barley. Costs, then, could be considered opportunity cost of foregone barley If costs per hectare were approximately the same for onions as for barley (108,451 for this farmer) and benefits were 102,250 x 2, or 204,500, then net benefit per hectare would be 96,049 Costs should, however, be higher as onions require more labor and yields should be considerably higher per hectare if onions were a monocrop. The above estimate of net benefit per hectare is probably too low.

Wet Season Crop

ANNEX III

TABLE 7
MILLET AND SORGHUM: FARMER #2

	1 Ha.
Benefits	
1.5 tons/ha . 150 CFA/kg (est.)	225,000
Costs	
Labor	
Land preparation (plant after wheat directly)	-0-
Weeding, 5 people @ 500 CFA	1,667
Harvest, 10 people @ 1 tas, est. @ 450 CFA	3,000
Water	
Est. same as wheat: 101,860/ha[1]	101,860
Total Costs Per Hectare	106,527
Net Benefit Per Hectare	118,473

Returns to Family Labor, 423 CFA/day (295 days/ha[2] - is days paid labor = 280 days)

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[1]Millet should take considerably less water than wheat. However, this farmer said that he irrigated 12 times for spices, 13 times for wheat, and up to 12 times for millet.

[2]See Annex II, Table 2.

ANNEX III

Wet Season

TABLE 8
MILLET AND SORGHUM: FARMER #3

Costs		3.5 Ha.	1.0 Ha.
Weeding		37,500	
Fertilizer (1 bag purchased and manure, 12,500 CFA)		12,500	10,715
Water, Irrigate 9 times. Est. based on 9/12 of wheat season Water costs per hectare			33,070
Total Costs Per Hectare			47,355
Return to Family Labor, Sorghum (295 days/ha)	639 CFA/day		
Benefits			
Sorghum, 15 sacks per hectare 35 sawals per sack, 525 sawals @ 450/sawal (3.3 kg)			236,250
Net Benefit/Hectare, Sorghum			188,895
Return to Family Labor, Millet (295 days/ha)	469 CFA/day		
Millet	4.5 Tas/Ha; 7.5 sawal/Tas @ 550/sawal		185,625
			138,270

ANNEX III

Wet Season Crop

TABLE 9
RICE: FARMER #3

Floating Rice

		1 Ha.
Benefit	10 sacks, 50 sawals/sack @ 225 CFA/sawal	112,500
Costs		
Labor:	Harvest, 2 boats, 2 days, 6 people/ Boat, 2 sawals/person/day + 15 sawals for Boat (2 days) = 63 sawals @ 225 CFA	14,175
Water		-0-
Net Benefit Per Hectare		98,325

Upland Rice

Benefits	4 sacks, 1/4 ha = 16 sacks/ha 100 kg/sack = 1600 kg/ha @ 225 CFA/kg	360,000
Costs		
Labor:	Cutting, 6 peo, 1 day per 1/4 ha Threshing, 6 peo, 2 days per 1/4 ha Total: 6 peo, 3 days @ 1 sawal 225 CFA kg x 3.3 kg/sawal x 18 x 4	53,460
Water:	Diesel + oil @ 3.125[1] x wheat costs	88,000
Interest		6,875
Total Cost Per Hectare		148,335
Net Benefit Per Hectare		211,665
Return to Family Labor	847 CFA/day[2]	
	705 CFA/day[3]	

[1] Estimate based on water requirements of rice crop.

[2] 322 days total (see Annex II, Table 3) - 72 paid = 250 days

[3] If total family labor was 300 days/ha

ANNEX III

TABLE 10
WHEAT BUDGETS, 1984-1985 CAMPAIGN
Per Hectare, CFA

	Farmer #1	Farmer #2	Farmer #3	DJ Model	Atalier Cost Rec.	Gen. Est.		
Costs: Labor Hired								
Turning Soil	10000	10000	28571			7500		
Making Irrig. Basins			4000			2500		
Levelling			14000			5000		
Fertilizing	-0-	-0-	-0-			-0-		
Seeding	-0-	-0-	4571					
Irrig. Maintain Canals	-0-	-0-	-0-					
Weeding	-0-	-0-	-0-					
Harvesting	12000	12000	5333			10000		
Threshing	30000	30000	1			20000		
Guarding/Bird Control	-0-	-0-	-0-					
Transport	-0-	-0-	-0-					
Subtotal, Labor	52000	43000	56475	44500		45000		
Water (Pumping)								
Gasoil (diesel)	55000	50000	25480	46000	30597	30600		
Oil	9360	3900	2685	4135	4907	4900		
Parts	37500	25000	11110	15000	20291	20300		
Labor (Redevance)		7500	4820	5000	5645	5600		
Subtotal, Water	101860	86400	44095	70135	61440	61400		
Other:								
Seed	-0-	-0-	5333	21200	2186	2200		
Chemical Fertilizer	-0-	-0-						
Subtotal, Other			5333	21200	2186	2200		
Interest (Operat. Costs)	?	?	1215		2220	2200		
Total Cost Per Hectare	153860	129400	107118	125835	65846 + Labor	110800		
Benefits, Wheat @ 600 CFA/sawal	444000	409090	323232[1]	509090	581818	581800[2]	400000[3]	909090[4]
Net Benefit/Ha	290140	287190	216114	373255	?	471000	289200	793290

Net Benefit Range: 100,000 to 400,000+ per Hectare, mostly 200,000-300,000

[1] Farmer #3 could not give total cost of threshing. He could give wheat produced after paying the threshers, in kind, for their work.

[2] Value of production if yield is 3.2 T/ha as measured by project staff.

[3] Value of production if yield is 2.2 T/ha, about average for farmers interviewed.

[4] Value of production if yield is 5 T/ha, which was reported by a very few project farmers. Presumably, these farmers also had higher input costs, but these are not estimated here as there is no basis for estimation. Net benefit figure is indicative only.

[5] Value of production if yield jis 1.2 t/ha which may represent the situation for the poorer farmers or in poor years.

ANNEX III

TABLE 11
ANISE & CUMIN BUDGETS, 1984-1985 CAMPAIGN (AND ONIONS)
Per Hectare, CFA

	Farmer #1	Farmer #2	Farmer #3	Atalier Cost Rec.	Gen. Est.	Onions Farmer
Costs: Labor Hired						
Turning Soil	20000		4000			
Making Irrig. Basins						
Levelling						
Fertilizing						
Seeding	10000		30000			
Irrig. Maintain Canals						
Weeding	15000					
Harvesting						
Threshing						
Guarding/Bird Control						
Transport						
Subtotal, Labor	45000		34000		45000	
Water (Pumping)						
Gasoil (diesel)						
Oil						
Parts						
Labor (Redevance)						
Subtotal, Water	101860		44095	61440	61400	
Other:						
Seed						
Chemical Fertilizer						
Subtotal, Other	-0-	-0-				
Interest (Operat. Costs)			1215	2220	2200	
Total Cost Per Hectare	146860		79310		108600	39655[1]
Benefits, Spice	750750		886600		708600	204500[2]
Net Benefit/Ha	603890		807290		600000	164845

Net Benefit Range: 600,000 to 800,000+ per Hectare

[1]This farmer intercropped onions with barley on 1/2 hectares of land. To estimate, 1/2 the per hectare cost for wheat/barley is taken as cost of intercropping 1 hectre of onion This is probably low. In calculating his farm income, however (Annex IV, Table), the co for the intercropped barley were assumed the same as the full per hectare costs of whea This means that when the crop budgets are added, the cost per hectre to intercrop barley i onions become 1.5 x the cost of wheat, which is probably a better estimate.

[2]The yield that the farmer received for a 1/2 hectare intercropped field x 2 for a 1 hect equivalent.

ANNEX III

TABLE 12
MILLET, SORGHUM & RICE (RAINS SEASON CROPS)

	Millet #1	Millet #2	Sorghum #3	Millet DJ Model	Floating Rice, #3	Upland Rice, #3
Costs: Labor Hired						
Turning Soil						
Making Irrig. Basins						
Levelling						
Fertilizing						
Seeding						
Irrig. Maintain Canals						
Weeding						
Harvesting	1667	10715	10715			
Threshing	3000					
Guarding/Bird Control					14175	17820
Transport						35640
Subtotal, Labor	4667	10715	10715	42500	14175	53460
Water (Pumping)						
Gasoil (diesel)						
Oil						
Parts						
Labor (Redevance)						
Subtotal, Water	101860	33070	33070	38575	-0-[1]	88000[3]
Other:						
Seed						
Chemical Fertilizer		3570	3570			
Subtotal, Other						
Interest (Operat. Costs)	?					6875[3]
Total Cost Per Hectare	106572	47255	47255	81075	14175	148335
Benefits/Hectare	225000	185625	346250	225000	112500[2]	360000
Net Benefit/Ha	118473	138270	188895	143925	98325	211665

Net Benefit Range: 100,000 to 200,000 per Hectare

[1] Floating rice is grown in low spots or "mares" which are filled when the river rises. In recent years, with the diminished rains, the river rises too late to plant, and farmers have the pumps to start the season. This farmer said that he took his pump out to the mare planning to pump water into the mare. He was lucky, however, and the river had come up far enough to wet the soil, without his using the pump.

[2] The farmer said that this crop sustained a lot of damage right before harvest due to birds which come at night (I wondered if he meant birds or thieves).

[3] This figure is not from actual records, but is extrapolated from the pump operating c (and interest on loans) from the wheat campaign, multiplying by 1.125, a factor represen the proportionally greater water requirements. This figure would be diminished somewha natural rainfall. Farmers were universal in saying, however, that they would get virtuall crops without the pumps.

Step 4: Farm Budgets and Cash Position

The crop budgets are added together in this section to make farm budgets and to make preliminary estimates of the farmers' returns per hectare and of their ability to finance new pumps. Six farm budgets are presented here: three representing estimates of the three most fully interviewed farmers, and three for the generalized (Types I-III) models of project farmers.

These estimates represent the sort of analysis which should be done to assess whole farm productivity, to estimate the farmers' ability to pay for new pumps, and to make projections of returns to the project as a whole as an investment in increasing farmers' income. These first six budgets should all be viewed with caution, however. They are preliminary estimates, based on available data but need to be more complete.

Annex IV, Tables 1 and 2, show what is known about the three farmers' incomes. We have no estimate of other activities (eg, raising animals, off-farm income) which would affect the farmers' ability to feed family members and to afford a replacement pump. The estimates of total farm income for famer #3 seems very high. It is entirely possible that some of his costs were left out, despite the interviewer's efforts to ask all necessary questions. In any case, these preliminary estimates should be supplemented by further field observations and estimates of other farmers' budgets.

The three generalized farm budgets, Annex IV, Tables 3-5, are based on the typology of Annex 1, Table 2, and the generalized crop budgets of Annex III, Tables 10-12. They are attempts to look at the farmers' viability in a more generalized way. For the wheat crop, a simple sensitivity analysis is shown in the form of alternate yield levels.

To show how cash position (and ability to pay for a new pump) is affected by both production and consumption, estimates of income at varying yield levels are combined with estimates of consumption needs for different sized families. The numbers of people fed per pumps are unknown. This analysis therefore suggests what might be happening, but again, further information is needed.

The numbers of people, 10 and 30, are picked because the "farmers" generally are thought to include more than one nuclear family (see Step 1 above). For estimating purposes, a figure of 1/2 kg grain per person per day is used. This figure is used as a rough minimum by nutritionists* and can be considered a reasonable estimate if the population includes a number of small children and if it can be assumed that the grain is supplemented by at least small quantities of vegetables and animal products.

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*SOURCE: J. Leslie. Personnel Communication.

Because these estimates do not include rainy season crops, vegetable production, herding/livestock production, or off-farm income, the model implicitly assumes that all income from crops other than wheat and spices is equal to all other expenses. Rainy season crops, vegetables and some of the livestock production might be considered as upgrading quality and quantities of consumption from the 1/2 kg grain per person per day estimate. Clearly, more data is needed to test the model.

The numbers for cash position may seem high given Mali's GNP per capita. If they are converted to a per person income equivalent (under the 10 and 30 person per pump assumption), the range is from $9 to $494 per person. (NOTE: This is not return to labor discussed in the previous section, nor per caita gross production, but cash position of the farm divided by number of family members.)

ANNEX IV

TABLE 1
NET BENEFIT FROM CROPS IN DRY SEASON

Farmer #1

1/2 Ha Wheat @ Net Benefit of [illegible],140 CFA/Ha	145,070
1/2 Ha Spices @ Net Benefit of [illegible]3,890 CFA/Ha	301,945
Net Benefit	447,015

Farmer #2

2 Ha Wheat @ Net Benefit of 287,190 CFA/ha	574,380
Spices: Small Area	49,000
Rainy Season 1 Ha Millet @ Net Benefit of 118,473 CFA/Ha	118,473
Net Benefit	741,853

ANNEX IV

TABLE 2
FARMER NO. 3

Net Benefit from Crops

	CFA
5.0 ha "wheat" actually 4.5 ha wheat and .5 ha barley intercropped with onions Net benefit/ha x .5	1,080,570
.5 ha onions intercropped Net benefit/ha x .5	82,423
2.0 ha anise and cumin Net benefit/ha x 2	1,614,580
7 ha, Total net income from dry season crops	2,777,573
3.5 ha "millet" of which 1. ha "gros mil" (sorghum) Net benifit/ha	188,895
2.5 ha "petit mil" (millet) Net benefit/ha x 2.5	345,675
1. ha floating rice Net benefit/ha	98,325
.25 ha upland rice Net benefit/ha x .25	52,916
4.75 ha, Total net income from wet season crops	685,811
Total Income From Crops:	4,096,279

Note: This farmer also has 5 mules, 13 cows, 80 goats and sheep and one hen with chicks. He also does some marketing of others goods. The number of people he actually supports is unknown. He has one wife, 4 (?) children, and his brothers and sisters' families sometimes were with him. He said he gave one ton to his brothers at harvest (removed in calculation of net benefit). His cash position is, of course, unknown.

ANNEX IV

TABLE 3
TYPE I FARMER

Net Benefit From Dry Season

	CFA
3.2 ha wheat	
(Net benefit/ha x 3) if yield is 1.2 T/ha[1]	322,146 (A)
if yield is 2.2 t/ha[2]	925,440 (B)
if yield is 3.2 t/ha[3]	1,507,200 (C)
if yield is 5 t/ha[4]	2,554,528 (D)
.2 ha vegetables	
Family Consumption Unknown	
if 10 people @ 1/2 kg/day (365 x .5 x 10 x 182 CFA)	332,150 (1)
if 30 people @ 1/2 kg/day	996,450 (2)

Cash position: Combines estimates of four yield levels (A, B, C and D) and two consumption levels (1, 2):

A, 1:	10,004	A, 2	(674,304)
A, 1:	593,290	A, 2:	(71,010)
B, 1:	1,175,050	B, 2:	510,750
C, 1:	2,222,378	C, 2:	1,558,078

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[1]Estimated yield of poor crop.

[2]Approximate yield level of farmers interviewed.

[3]Average yield of project farmers, 1984-85 season, measured by D. Jackson.

[4]Highest yields were 5 tons/ha, but reached by very few. This number might represent an upper limit.

ANNEX IV

TABLE 4
TYPE II FARMER

Net Benefit From Dry Season Crops

	CFA	
1.6 ha wheat		
if yield = 1.2 t/ha	171,811	A
if yield = 2.2 t/ha	462,720	B
if yield = 3.2 t/ha	753,600	C
if yield = 5 t/ha	1,277,264	D
1.6 ha cumin and anise Net Benefit x 1.6		
.2 ha vegetables	960,000	

Total Dry Season Crop Income

Case A = 1,131,811
Case B = 1,422,720
Case C = 1,713,600
Case D = 2,237,264

Farmers' Cash Position:

A, 1:	799,661	A, 2:	135,361
B, 1:	1,090,570	B, 2:	426,270
C, 1:	1,381,450	C, 2:	717,150
D, 1:	1,905,114	D, 2:	1,240,814

ANNEX IV

TABLE 5
TYPE III FARMER

Net Benefit From Dry Season Crops

	CFA	
2.0 ha wheat		
if yield = 1.2 t/ha	214, 764	A
if yield = 2.2 t/ha	578,400	B
if yield = 3.2 t/ha	942,000	C
if yield = 5 t/ha	1,596,580	D
1.2 ha cumin and anise	720,000	
.2 ha vegetables		

Total Dry Season Crop Income:

Case A: = 934, 764
Case B: = 1,298,400
Case C: = 1,662,000
Case D: = 2,316,580

Farmers' Cash Position:

A, 1:	602,614	A, 2:	(61,686)
B, 1:	996,250	B, 2:	301,950
C, 1:	1,329,850	C, 2:	665,550
D, 1:	1,984,430	D, 2:	1,320,130

Step V: Pump Costs and Financing

The original cost of the Cooper pumps, calculated in 1978, is presented in Annex V, Table 1 for reference only. The 1978 prices are not strictly comparable with 1985 prices as inflation is not included. An amortization payment was calculated for eight years at 8% interest, the terms at the time. If payment was once a year, it would have been 57,338 CFA/year, annual fixed cost of 17,918 per hectare if the area irrigated was 3.2 hectares. Old project records unfortunately do not show how much of the original purchase prices was paid off or by whom.

The costs of new pumps are presented in Annex V, Table 2. Three options are presented: a Lister, a Lombardini, and an option which is currently being tried on an experimental scale by the project: a new Lombardini motor in combination with the existing Cooper pump replacing the Cooper motor. The project staff is leaning toward the Lombardini option on the basis of its quality and the fact that there is a local distributor.

In Annex V, Tables 3 and 4, various options for pump financing are explored. In Table 3 the total cost of a Lombardini Quarto 20 is financed in different ways to compare options. The project staff currently uses 12% interest on short term loans and plans to use 12% for pump financing also. Payments are calculated for 5, 8 and 10 year financing periods. The Lombardinis should last at least 10 years with good maintenance.

Because the farmers get most of their income at the two yearly harvests, and most cash from the spice crop, payments were calculated on the basis of paying one or two times a year (as well as the more conventional 12). Payments were also calculated at 6% interest for 5, [illegible] and 10 years (one payment per year basis) to see how the decision to subsidize interest rates would affect payments. The range of financing options suggested gives payments per year ranging between approximately 150,000 and 300,000 CFA.

In Annex V, Table 4, lower cost scenarios are explored. First the amortization of the whole Lombardini-Cooper hybrid and spare parts package is calculated with the same options as in Table 4 for the Lombardini. Annual payments range from about 115,000 per year (for 6% interest over ten years) to 235,000 per year (for 12% interest over five years).

Other options are then tried. The cost of the Cooper pump (40,000 CFA) is removed on the grounds that the "hybrid" is being bought by someone who already has a Cooper pump.

Then spare parts for both Lombardini motor and Cooper pump are removed from the initial calculation of investment (at 50% of purchase price for five years' parts) and treated as annual variable price (at 10% per year). Project staff are inclined toward outright purchase of spare parts. However, the farmers could save considerably on annual budgets by not paying for so many parts initially. Payments could be 182,858 per year f[illegible] years financing plus parts or 140,770 CFA per

year with 6 years financing. Until there is better data on farm income and expenditures (of the type explored in Step IV and Annex IV, Tables 3 4 and 5) it is difficult to say what the farmers can affort to finance. It should be noted by contrast, however, that the atalier rents out pumps to farmers by the week, or month in case of breakdown, and that a couple of farmers p... in the neighborhood of 80,000 CFA rental last season (1/2 year).

The credit records for this current (ending 4/85) wheat and spice campaign, once debt recouperation is finished, should cast some light on this. At the time of this writing (5/1/85) it appeared that debt recouperation was proceeding very well, but it is simply too soon to tell. Some farmers had paid off all of their debts and most of the rest of the villages which had been visited were paying off more than half. Recouperation was proceeding at almost 1 million CFA per day with about 12 of 28 million recovered. The effective deadline for debt repayment is the next time the farmer wants credit (the beginning of the rainy season campaign), and the problem cases will become most apparent toward the end of the repayment period.

Once the repayment records for the wheat campaign are available, a thorough examination of the extent and reasons for unpaid debt--and also an estimation of what factors are correlated with credit-worthiness should offer some policy guidelines.

Factors correlated with full repayment of debt might include achieving certain yield levels per hectare, a minimum farm size or ratio of land to persons fed, adequate family labor, pump repair costs below a certain level, planting and irrigating on time, etc.

Factors associated with non-repayment might be anything from poor management to living in an area which lost all water mid-campaign (one area was irrigating from ponds which dried up last season) to producing well and efficiently but choosing to feed more people rather than pay off debt.

If the relative importance of factors such as these could be evaluated, it would help greatly in determining both the long run viability and directions in which to concentrate efforts of the project.

ANNEX V

TABLE 1
FIXED AND VARIABLE PUMP COSTS*
CFA, 1978

Fixed Costs, Cooper Pump

5 hp diesel pump set, 7 m suction pipe and 3 m delivery pipe	$ 732
Spare parts set for 5 year (50% of above)	366
20 m of 80 mm delivery pipe @ $7/m	140
2 fuel barrels at $30	60
Transport from Bamako to site	20
Total Cost Installed = 329,500 CFA =	$ 1,318
250 CFA = $1.00	

Annual Fixed Cost/Ha

Assuming amortization over an 8-year period at 8% interest in (1978)

Annual Fixed Cost = 57,338 (calculated as 1 x yr payment)

Annual Fixed Cost per Hectare = 17,918

*SOURCE: D. Jackson, 4/85, Diré.

ANNEX V

TABLE 2
INITIAL INVESTMENT REQUIRED
(INCLUDING STOCK OF REPLACEMENT PARTS)
TO PURCHASE NEW PUMPS/MOTOR*
In CFA, 1985

Lister [illegible] - Pegson 62.5m^3/h with suction [illegible] and foot value	1,020,000
5 spare [illegible]rts for 5 years (10% of pp/yr) 50%	509,800
6 lengths of discharge pipe @ 10,000 each	60,000
2-200 liter fuel barrels (new) @ 12,000 each	24,000
	1,613,800
Lombardini Quarzo 50m^3/h - simple	
Suction hose and foot value (est)	615,780
Spare Parts for 5 years (50%)	62,000
6 lengths of discharge pipe @ 10,000 each	338,890
2-200 liter fuel barrels @ 12,000 each	60,000
	24,000
	1,100,670
Lombardini-Cooper hybrid motor/adaptations p.v. of pompe Cooper	469,000
Spare parts (50% of both motor and pump)	40,000
6 lengths of discharge pipe @ 10,000 each	254,500
2-200 liter fuel barrels @ 12,000 each	60,000
	24,000
	847,500

*SOURCE: D. Jackson, 4/85, Diré.

ANNEX V

TABLE 3
PUMP AMORTIZATION

Lombardini Quarzo

Total Cost
To Be Financed: 1,100,670 CFA

Interest Rate (%)	No. of Payments/yr	No. of Years	Payment	Payment/Year
12	1	5	305,337	305,337
12	2	5	149,546	299,092
12	12	5	24,464	293,806
12	1	8	221,508	221,568
12	2	8	108,914	217,827
12	12	8	17,889	214,668
12	1	10	194,801	194,801
12	2	10	95,961	191,923
12	12	10	15,791	189,497
6	1	5	261,295	261,295
6	1	8	177,247	177,247
6	1	10	149,546	149,546

If Cooper pump is sold at 40,000 CFA and applied to purchase price of Lombardini.

ANNEX V

TABLE 4
PUMP AMORTIZATION

Lombardini-Cooper Hybrid: 847,500 CFA

Interest Rate	No. of Payments/yr	No. of Years	Payment	Payment/Year
12	1	5	235,105	235,105
12	2	5	115,148	230,296
12	12	5	18,852	226,226
12	1	8	170,604	170,604
12	2	8	83,862	167,724
12	12	8	13,774	165,291
12	1	10	149,994	149,994
12	2	10	73,889	147,778
12	12	10	12,159	145,910
6	1	5	201,193	201,193
6	1	8	136,478	136,478
6	1	10	115,148	115,148

Remove value of Cooper Pump (40,000 CFA)
807,500 @:

12%	1	8 yrs	162,552	CFA/year
12%	1	5 yrs	224,008	

Treat Spare Parts as Variable Cost, 10%/year
553,000 @:

12%	1	8 yrs	111,320	
			29,450	Parts
			140,770	Total/year
		5 yrs	153,408	
			29,450	Parts
			182,858	Total/year

Step VI

Ideally, scenarios for increased productivity with the Cooper pumps as a result of continuation of the project and for increased productivity due to the sale of 20 new pumps per year (60 total) should be projected. These would represent the "with project" scenario which should be contrasted to the "without project" scenario, both extended out for a reasonable life expectancy of the new pumps, say ten years. Calculations relating the initial cost of the investments to the benefits realized over the ten years could then be calculated.

This could be done with more complete data and more time, but would in this case still rely on some difficult estimations for the "without project" case which is not simply a continuation of the present situation. Both the farmers and the project staff are convinced that if the project were to stop now, the Coopers would soon go out of operation after the atalier closed, and that most farmers--even assuming that they could keep their pumps in working order--would have a hard time getting commercial credit to buy fuel and oil. Production would fall dramatically.

This analysis could and should be done soon. See Annex VI for an explanation of limitations which prevented the calculation of a realistic financial IRR at the time of this writing.

Step VII

Since the aim of the project is to organize the atalier repair services and credit in such a way that the project would become self-sustaining without outside aid in the near future, the question of project revenues and cost recovery is important. Annex VII, Table 1 gives estimates of profits to the project from sale of diesel fuel, oil, plastic jugs, and seed for the wheat and rice campaigns, net of fuel and oil consumed by project vehicles.

This comparison suggests that project sales can currently cover some of operating costs, specifically (Malian) atalier staff salaries and the fuel and oil used by the project vehicles. Redevance (farmers' dues) currently pays the salaries of the field mechanics. Further analysis will be necessary to determine what project costs must be covered and how as the project moves toward independence. Coop formation and management skill development (covered elsewhere) are major issues.

An economic (as opposed to financial) analysis, including a measurement of the economic IRR (internal rate of return) for the project as a whole would give a more comprehensive estimate of the costs and benefits of the project as a whole. It could be done with more complete data and a bit more time.

ANNEX VI

TABLE 1
ESTIMATES OF PROJECT INCOME FROM SALES*

		CFA
Wheat Campaign		
Diesel fuel		
Gas oil consumption, 1 campaign 90,000 l		
(atalier used N 500 l,		
Cost	185 x 90,000/l	16,65 00
Price	230/l x 90,000/l	20,700,000
Gain	45 CFA per l, x 90,000	4,050,000
Cost of 5000 l. used by atalier		- 925,000
		3,125,000
Oil 3088/l - 605 per l. cost (Bamako)		
775 per l. price		
170 CFA per l.		
Plastic jugs		524,960
		37,500
		562,460
Truck hired to deliver oil		- 100,000
Oil used by atalier (280 l)		- 169,400
		293,060
Seed 16 tons = 4,850 sawals		
Cost per sawal		450
Price per sawal		500
Gain		50
50 x 4850 =		242,500

*SOURCE: M. Short, project records. 4/85.

ANNEX VI

TABLE 1
ESTIMATES OF PROJECT INCOME FROM SALES
(Continued)

Rice Campaign

	CFA
Gasoil - estimated consumption 42,000 l	
Cost, 42,000 x 185	7,770,000
Price 42,000 x 230	9,660,000
Gain on sales, 42,000 x 45 CFA	1,890,000
Oil - estimated consumption, 1,500 l	
Cost, 1500 l x 605	907,500
Price, 1500 l x 775	1,162,500
Gain on sales, 1500 x 170 CFA	225,000

Total Gain:

3,125,000
293,060
242,500
1,890,000
225,000
5,775,560

Atalier salaries for 12 months: 5,700,000 CFA.

ANNEX VII

TECHNICAL NOTE
NOTE ON CONSTRAINTS TO THIS ANALYSIS

There were two major constraints to getting complete information which would have made a more complete analysis of the project possible (1) the very short duration of the trip and (2) the season.

(1) Interviews take a long time for several reasons:

-- Translating from French into the local languages--two Songhrai dialects--and back takes time and frequently required extra questions to clarify exact meanings.

-- People give prices in both FM and in CFA, and one person may give prices paid or received in both currencies.

-- Measures vary (i.e., two kinds of pots for grain measure in the market in Diré--two different sized [different brands] powdered milk can, one of which conveniently turns out to hold exactly a kg of rice when measured in the traditional way: piled as high as possible above the rim of the can; a 'sawal' of grain is 3.3 kg in the Diré market--the project having designated one specific sawal (wooden bowl) as the official measure for project grain--and only approximately half that weight in Timbouctou. There is a special basket for measuring onions, different grains are measured in "tas" and "têtes", bhunches, the amount harvested from one carréé (small irrigated square, also varying in size) etc. Everything is measured in "sacs" or bags, varying widely in size from the fairly standardized western grain sacks to locally made mat bags in every size.

The farmer who was my main informant was the one who was the most precise. He explained such subtleties as the fact that the "sac" of spice which he took to Bamako to sell was packed particulary well and held 220 "pots", whereas the others held 180, etc. Other farmers told me that they had harvested, for instance, 5 "sacs" and sold spices at 350 CFA per pot, but did not know either how many pots to a sac nor how much money they had taken in (or were unwilling to be so specific).

(2) The time of year was a disadvantage for several reasons:

-- There were no crops to see beyond a few small plots of vegetables.

-- No irrigation was taking place.

-- The project was putting all of its efforts into debt recouperation. Farmers who came into the atalier came to pay off their credit (and several consented to be interviewed). Those who were not as inclined to pay off their debts, presumably those who had had a poor crop, were not around.

I went to one village on a debt recouperation trip. It was clear that it was a poor atmosphere in which to interview because debt recouperation is a very public process whereby each sawal of grain is measured and counted aloud and then tossed into sacs which are sown shut on the spot to guarantee that everyone is satisfied that procedures are standard and honest. The chance for a private conversation is nil. The fact that we were sitting outside in a mild sandstorm didn't help.

It might have been possible to get a farmer and a translator and go to the truck and roll up the windows to talk (despite the heat). However, the main activity of the day was obviously debt collection, and it was clear to me that it was a poor time to interview if one hoped for accurate answers.

A longer visit during a cropping season should provide much better opportunity to arrange relatively private interviews in the farmers' fields, or at the project office. As if visits for end-of-campaign analysis took place in the midst of the following campaign, the project records of yields, debt recouperation, etc., for the just-finished campaign would be complete.

It is hoped that the framework provided in this analysis will be of use--and modified as necessary--in future analyses.

Step VIII

Although it is difficult to ascertain with certainty, the analysis of available data (which is mostly based on figures from the beginning of Africare's management until the present less than one year, and to a lesser extent earlier records which are extremely complex and emphatically not complete) suggests that the project should, within a reasonable amount of time, begin to pay for its own overhead. The early major investments will not be recouped. However, they are mostly in place, and it may be argued that with the continuation of project support, their usefulness and productivity will be continued and, I believe, increase. Without that, at the moment, the project's services and the potential productivity of the office, repair shop, grain storage and resale as well as the continuing operation of existing equipment (i.e., pumps) belonging to the farmers would almost certainly fail.

It does seem possible that in a reasonable time, the services now provided by the expatriate staff and AID funding, could be taken over by the local Malians even including financing of new pumps. The constraints to this scenario are considerable, and it is by no means sure, but it does seem possible if several things were to happen, and they appear to be, at least, underway:

1. There must be reliable availability of inputs and credit for inputs for the pumps.

This is clearly happening. Management of inputs is improving. Despite considerable transport difficulties, periods of fuel shortages were much fewer and shorter this past season than previously. At the moment, all of Timbouctou is completely out of gas and oil, while the project scheduling with private transporters still has sufficient amounts with more in transit.

2. Mechanical repair of the pumps must be available.

The project has trained mechanics, presently 15 mechanics of varying capabilities but mostly adequate to good, and is in the process of training six more (with one engine each which they break down reassemble and then test run, with practical examinations as testing). The project has also maintained a very small stock of pumps available on a per day or per month rental basis. The fee is based on actual costs, and the rental pumps were in almost continuous use in the just-finished wheat campaign.

3. New pumps must be made available both to replace those which are wearing out and also to allow more farmers to irrigate.

No pumps have been sold by the project apart from the original shipment, the last of which was sold in 1982.The project files contain the names of approximately 100 farmers who have applied to buy new pumps.

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*SOURCE: David Jackson

4. The farmers who purchase new pumps must be able to pay for them in a reasonably short period of time.

The financial analysis suggests that this will be possible if productive inputs and services are reliably available. The market for grain is very strong to say the least. Wheat from the last season could now be sold in the market at very good prices. Unfortunately, the farmers are unwilling to sell grain outside the region--or even, in any quantity in local markets. Despite the current appeal of high prices, the overall shortage is such that project farmers fear--quite reasonably, it seems--that if they sell now, they will be unable to purchase later in the season when they will need grain. The project is supplying important storage facilities which the farmers are paying for.

The market signals are there, but the transportation bottlenecks are such that there is no assurance that supply can meet demand even at an elevated price. Even the considerable amount of relief grain, both free and subsidized, has not been sufficient to begin to cause market prices to fall. (Not surprisingly, there is some belief that local officials are profiting from resale of relief grain.)

Under present conditions, and for the near future, at least it appears that if the project farmers were able to produce more grain, through increased area under cultivation (i.e., more pumps, and increased yield per area), the prices they would receive for their grain would be <u>at least as high</u>

as those which they presently receive from the project atalier, and considerably higher if they felt sure enough to be able to sell to surrounding regions (i.e., Timbouctou and the area between Timbouctou and the project).

Even the project staff, while realizing the possibility of increased financial gain from selling in Timbouctou, feel that they cannot do so as they know that their farmers will return to buy back the grain sold to the project. They feel that if the grain were sold, and not available to local farmers both for consumption and for seed, the farmers' loyalty to the project would be undermined. This is clearly a decision not based on economic/financial grounds as much as humanitarian and administrative (i.e., the importance of building a strong project foundation) Given the partial failure of the market, there is probably adequate justification for the decision.

The project staff do not feel that they are subsidizing the future consumption of the farmers. They are meeting their costs and making a small profit, at least as far as the grain itself is concerned, but neither are they profiting from the elevated prices due to unmet demand, particulary in Timbouctou, where grain prices are 20% higher than in Diré, even taking transport costs into consideration.

5. The additional production achieved by the project farmers should bring enough revenue into the project itself to be able to cover its operating costs and some overhead and expansion costs.

Operating costs, including overhead, must be covered if the project is ever to become one which the farmers could run for themselves. Preliminary estimates suggest that currently the project revenues can cover the salaries of the local staff and mechanics. Further analysis, including more detailed data on farm production and good estimates of future production, are necessary to determine how much else (i.e., equipment costs, replacement and expansion) could be covered by project revenues.

6. A structure must be formed which would allow the farmers to take over the operation of project services--and personnel must be trained.

Both of these functions have begun, but both are in the preliminary stages. These issues are part of the project proposal. Clearly, much work must be done with the farmers, who are wary of cooperatives from past bad experiences. Local farmers see the advantages of dealing with expatriate staff who are largely outside of local political sway and act as farmers advocates generally, rather than working with the interest of a few individuals or one tribal group foremost.

Currently, some of the Malian staff are developing considerable expertise in bookkeeping, management of the shop and operations generally. Policy formulation and overall management and design capabilities must be nurtured, as must general literacy and numeracy.

7. Entrepreneurial spirit and initiative and willingness to work must be strong.

My experience with the farmers is too brief to pass judgment on this. Two things suggest that these qualities are available in abundance: the generally high level of market involvement and the results of interviews with the project's farmers. There is no doubt that farmers can make money on every crop (barring disasters) and are enthusiastic about doing so.

8. Market conditions must be favorable. This seems to be adequate.

Sufficient demand (effective demand, but also need unmatched by purchasing power) exists to sell large amounts of food of all kinds (see #4 above). Prices will not fall because of increased project production.

9. The ecology of the area must not deteriorate much further.

This last point is critical--and not foreseeable. I personally am appalled by the extent and devastation of the drought. Water is still available, but the river has reduced drastically. All farmers told me that without the pumps, their production, their livelihood and their continued residence in the area would be in jeopardy. Even discounting their clear bias and wish to impress me, and anyone associated with the project (or any outside aid), with the desparateness of their situation, I believe that they are telling the truth.

If the drought situation were to continue to worsen, clearly ever-receeding waters would make present levels of production less viable.

If the worst case scenario does not come to pass, but the situation remains as it currently is, the project should be able to continue to grow slowly, I believe (on the grounds of interviews with farmers and project staff--and the preliminary analysis). And, if the drought situation lessens gradually, the project should be able to grow more rapidly and to help to form a basis for reestablished and increasing agricultural production. If the decision is made to continue to help people to stay where they are and to fight the drought, this analysis suggests that the financial returns to the farmer are easily sufficient to warrant continuation--and expansion--of the project.

V. PROJECT DESIGN AND IMPLEMENTATION

A. Project Implementation Plan

The project will use a seven-person technical assistance team to coordinate and manage all activities programmed for the three-year period. Two members of this team, the Administrative Assistant and the Project Manager, will be based in Bamako to perform administrative backstopping, coordinate logistics, arrange procurement of project commodities, and serve as liaisons between host government officials, representatives of the United States Peace Corps, and USAID. The five remaining technicians will be based at the project site. They will consist of (1) a Project Coordinator who will supervise overall field activities and local staff, participate in the organization of the farmer cooperatives, maintain permanent contact with local GOM services in Dire, assume responsibility for project reporting, and manage all financial operations in the field; (2) an Agricultural Engineer who will establish and supervise an Ag. Extension program and an agri-research program; he will also install and test various alternative energy equipment; (3) a Mechanic (specializing in motors and pumps) who will supervise the training of new mechanics, maintain parts inventories, and anticipate parts procurement; (4) a Credit/Cooperative Manager who will divide his/her time among training a credit personnel, and helping to strengthen the farmer cooperatives by working with the cooperative leaders; (5) a Logistician/Administrator who will be responsible for maintaining a field operating fund, writing monthly financial reports, assisting the Credit Manager maintain credit accounts, supervising

in-country travel, payroll procurement (follow-up) and inventories. The services of all seven technicians will be contracted through Africare Headquarters in Washington.

There will be four Malian government services directly or indirectly involved in the project's implementation. The first is the Direction National de la Cooperation through its local Centre d'Assistance et de Controle--Movement Cooperatif (CAC) office in Dire. The cooperative service will primarily help the project establish farmer cooperatives. The second is the Direction National de l'Alphabetisation Fontionnelle (DNAFLA), the service which provides adult literacy training throughout the country. DNAFLA and the CAC will team up to plan an adult literacy program for Activites Paysannes farmers. The other government services are Action Ble and the IER. The former is the local agricultural extension agency with whom the project will seek to strengthen its relations over the next several years; the latter is the agricultural research station with which the project has already worked conducting farm trials. The project will continue to work with the research station expanding upon the farm demonstration trials already begun.

In many ways, Africare will be able to take advantage of this past year's project experience vis-a-vis the logistical difficulties; familiarization with farmers' groups, farmer planting habits, construction contractors, village leaders, local authorities; and establishing preliminary contact with Action Ble, IER and the CAC in Dire. Africare presently has an experienced three-person medical team working at the

project site; their presency will help sustain the present momentum and assure timely implementation of future project components.

Africare will establish a system for the management and administration of project equipment, operations commodities, and funds. Africare will continue to supervise this system until the Farmer's Cooperative Management Committee is capable of assuming these responsibilities.

The overall responsibility for receipt and administration of project funds and for reporting on the project through written reports to USAID will rest with Africare. Support from Africare's headquarters in Washington will be accomplished in part by existing personnel and offices (controller, accountant, program development team, etc.), and through consultants hired specifically for the project. All project funds received will initially pass to Africare Washington; that portion intended for local expenditures will then pass to Africare's Representative in Mali to be managed by him there.

During the Activites Paysannes Interim Evaluation conducted by Africare and USAID in February 1985, several roles were explored whereby United States Peace Corps volunteers could greatly assist the project achieve its objectives. The five areas outlined in the evaluation report are as follows:

1. Implementation of the literacy and management training programs for the farmer cooperatives.
2. Participation in farmer cooperatives.
3. Acting as counterparts to the Action Ble and research station agents working with farmers.
4. Management of the revolving credit program.
5. Establishing mechanic work[illegible]

The U.S. Peace Corps is presently designing a new Food Systems Initiative Program and Mali has been selected as one of the countries where it will be tested. In February 1985, a special Peace Corps consultancy team did a preliminary feasibility study of Mali to determine which regions volunteers would most likely have the greatest impact. The Sixth Region is one such region under consideration. A follow-up Peace Corps team is expected to arrive again in May 1985. During this visit Africare and Peace Corps will continue discussions concerning common objectives and collaboration in the Sixth Region of Mali (see annex (for Africare Food Systems Initiative, Potential and Options)

Farmer Cooperatives--The farmer cooperatives will be organized to bring members together in a democratically governed organization to select leaders and participate in decision-making. Each member will be a cultivator (using small motor pump irrigation) of a food production plot. Cooperative members will have access to credit for farm inputs through the cooperative.

Cooperative members will recieve training through the CAC in Dire. The training programs will include adult literacy and farm management. The Cooperative Management Committee will receive additional training in cooperative administration.

The cooperative organizers (Africare, CAC, and the Dire Development Committee) will agree to form a team which will be concerned with identifying suitable farmer groups to join the cooperative. Decisions concerning the overall organization of

the cooperative will be made in conjunction with local government administrators and local traditional leaders.

A survey designed by the cooperative organizers to pinpoint local needs and to quantify the availability of material and labor sources will be made. As part of the survey, organizers will hold meetings in which the farmers will be encouraged to express their opinions. The purpose of these meetings is to get the farmers to participate in the decision-making process. After the survey has been completed, the organizers will outline a long-range program which will put a viable farmer cooperative into place.

Training--The training component of this project will prepare the farmers to put recommended cultivation methods into practice; enable the project mechanics to obtain a proficiency in motor pump repairs; and assist the farmer cooperatives management committee to grasp a working knowledge of cooperative administration.

Short training sessions will be held to introduce topics such as the basic objective of irrigated agriculture, motor pump mechanics, and the fundamentals of credit systems. Tentative training sessions include:

A. Agriculture

- wheat and rice irrigation as well as other crops
- pumps and their maintenance
- the use of irrigation water
- land preparation
- agricultural chemicals
- harvesting and processing
- cooperative management
- credit

B. Credit System

- accounting
- interest rates
- credit commodities
- credit policies
- credit recovery

C. Motor Pump Mechanics

- cylinder heads
- governor mechanisma
- engine blocks-oil pumps
- fuel system
- lubrication system
- cam and value train
- crankshaft and flywheel
- piston, connecting rod and cylinder sleeve
- cooling system
- cooper centrifugal pump

Research--The Dire crop research station (Service de Pecherche de Cultures Vivriere et Oleageneuse) has been actively conducting experimental trials involving grains and legumes for eight years. Their program consists of varietal comparisons of wheat, rice, sorghum, and millet; comparative fertilizer trials; tillage trials; and water management trails focusing on irrigation intervals and field layout.

The research station established a demonstration plot near the village of Bourem during the 1984-85 wheat campaign. The Activites Paysannes project's technical services division also conducted a limited experiment near the city of Dire. This endeavor concerned wheat and barley trainls, on farm fertilizer trials, and water management data gathering.

Joint discussions between the project staff and director of research (of the research station) identified mutual areas of interest in expanding the on-farm trials in coming seasons. Initial results of experiments conducted at the station indicate that there are potential benefits in adopting the following agronomic practices:

1. Irrigation intervals of 7-10 days
2. seeding rate of 100 kgs/hectare

3. arranging the field into raised beds and applying water to trenches formed between the beds

4. changing to the Hindi Tomson variety of wheat

The continuation of the project would include a joint program between Activites and the Dire research station, of on-farm experimental trails and demonstrations. In year 1 of the continuation, five villages are targeted for the program. One farmer in each village will be solicted to participate in the research and demonstration trials. The creastion of a participant policy and contract will define and elaborate on the conditions, limitations, commitments, and responsibilities for each party to the research program. In this manner, misunderstandings, conflicts, confusion, and general chaos are kept to a minimum.

Participation--There are three parties involved in the research process: (1) the farmer (2) the research station (3) the project. The responsibilities of each party are as follows:

> The Farmer--He is required to set aside one-fourth of a hectare for the research exercise. Labor for preparation of the soil and crop management are his responsibility. He must be willing to follow the advise of the technicians participating in the exercise. The farmer will keep all production from the research exercise. In case of unforeseen crop failures determined to be a result of the exercise, the farmer will receive compensation equivalent to the losses incurred in the research exercise.
>
> The Research Station--This institution will provide the improved inputs, methods, and advice on the use of the inputs that the farmer will emlpoy. This includes technical staff for research plot establishment, follow-up, and monitoring and inputs such as seed, fertilizer and soil/water managemtn practices.
>
> The Project--The project's role involves the selection of suitable candidates based on records of past performance, supporting the experimental process by providing logistical support to the research station staff

In years 2 and 3 of the project, the research and demonstrations will be repeated in different villages. The objective is to multiply the awareness of the methods, thus allowing farmers in various places with given production preferences to witness the effects of the new changes.

These research and demonstration trials will also be conducted on rainy season crops such as millet, sorghum, and possibly rice. The format will follow that given above for wheat. Again, emphasis will be focused on water management, soil management, and high performance varieties. Beyond this, there will be a focus on gathering data during the rainy season. Expenses for production will be monitored; areas under cultivation for the different crops will be estimated and the quantities of labor and other inputs will be accorded.

Extension -- In order to encourage farmers to adopt the modifications done in the research and demonstration trials, an effective extension component is necessary. Recommended practices will be extended to the average farm with the help of field agents employed by Action Ble Dire and possibly Peace Corps volunteers. This will require significant cooperation with Action Ble and additional logistical support.

The field agents will participate in seminars and training sessions regarding the methods and practices to be promulgated. This training will be an on-going process both at the research stations and in the field.

Beginning in the second year, the field agents will work with farmers in their respective villages. Inputs will be available through the project (fuel, oil, par[illegible]credit) and the research station (seed, information). The [illegible] will provide transportation

to the agents; bicycles will be at their disposal during the season and a pick-up truck will be available when necessary. Extension activities will begin in the year following the trials. Because the farmers have proven to be highly motivated and eager to make progress, the project should be able to quickly assimilate useful information. This spread of information will, in turn, be realized in the form of improved irrigation practices and higher yields.

Credit Fund

In order to insure two harvesting seasons, the project will support a revolving credit fund. The fund's credit policies will be based on forms of security that differ from traditional collateral, such as the farmer's standing in the community or group commitment to loan repayment. For formulation of these policies, data will be gathered to determine appropriate credit amounts, interest rates, repayment schedules, and substitutes for traditional forms of collateral.

The project staff and the cooperative leaders will be trained as effective intermediaries to evaluate credit requests, establish credit commotities criteria, and make disbursements and collection repayments

An essential role of management will be to choose cooperatives carefully enough to insure a high rate of repayment. Management and the cooperative officers as leaders will be required to

1) know the farm community thoroughly so that they can sort out the good from the bad risks and, more importantly know how to manage different types of risk situations

2) have intimate knowledge of each farmer so that they can work out terms and administrative procedures quickly, extend credit quickly and administer collections effectively

3) provide constant surveillance and supervision of the credit extended, know changing conditions of the farmer* and adapt to those changes as they occur.

The project will also address the problem of insufficient information concerning the credit needs os small scale farmers. In addition to being informed about where and how to obtain credit, farmers must also be aware of their production needs. Through adequate training, the farmers will be shown how to anticipate what their agricultural requirements should be for a planting season or given year based on the number of hectares under cultivation.

B. EVALUATION PLAN

The project shall be evaluated on a yearly basis with the first evaluation taking place at the end of year one The purpose of the evaluations will be to determine progress toward and accomplishments of projects objectives as outlined in the log-frame

The evaluation will also measure the extent to which the project has been successful in achieving its primary aim of providing economic and environmental benefits to its intended recipients. Another purpose of the evaluations will be to draw lessons from the project experience with respect to their applicability to the planning and implementation of future projects in Mali and, for that matter, in

*For example, if a farmer should lose his fields, the credit managers would have to reschedule his credit repayments based on the evidence presented.

the Sahel. This aspect of the evaluation would examine the implementation, technical, and institutional dimensions of the project and draw some broader conclusions on how to best approach similar undertakings in the future.

Monthly and quarterly progress reports, in addition to the evaluations, will be used to monitor achievements with respect to implementation schedules, management plans, budgets, and the log-frame. The evaluations will be conducted jointly with USAID/Mali, GOM, and Africare.

ACTIVITIES PAYSANNES BUDGET

SUMMARY - 1985 THROUGH 1988

BUDGET CATEGORY		YEAR 1	YEAR 2	YEAR 3	TOTAL
I.	PERSONNEL & FRINGE	287,650	287,688	320,148	895,486
II.	TRAVEL & ALLOWANCES	161,190	140,568	159,141	460,899
III.	EQUIPMENT & SUPPLIES	188,002	75,300	48,130	311,432
IV.	CONSTRUCTION	12,500	8,000	----	20,500
V.	TRAINING	15,300	15,800	16,800	47,900
VI.	OTHER DIRECT	47,000	48,000	37,500	132,500
VII.	INDIRECT COSTS	157,738	137,695	143,875	439,308
	TOTAL	869,380	713,052	725,596	2,308,028

FINANCIAL PLAN

Budget

ACTIVITES PAYSANNES
THREE YEAR BUDGET
(U.S. DOLLARS)

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
I. PERSONNEL							
AFRICARE EXPATRIATE SALARIES							
Project Coordinator	35,000 + 7%	37,450 + 7%		35,000	37,450	40,070	112,520
Agricultural Engineer	30,000 + 7%	32,100 + 7%		30,000	32,100	34,347	96,447
Pump/Shop Mechanic	25,000 + 7%	26,750 + 7%		25,000	26,750	28,623	80,373
Credit/Cooperative Manager	25,000 + 7%	26,750 + 7%		25,000	26,750	28,623	80,373
Logistician/Admin	25,000 + 7%	26,750 + 7%		25,000	26,750	28,623	80,373
Project Manager	12,000 + 7%	12,840 + 7%		12,000	12,840	13,739	38,579
Admin.Assistant	12,000 + 7%	12,840 + 7%		12,000	12,840	13,739	38,579
AFRICARE LOCAL HIRE STAFF							
Assistant Credit Manager	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Operations Assistant	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Administrative Secretary/Bamako	950 + 7%	1,017 + 7%		950	1,017	1,088	3,055
Chief Administrator	2,000 + 7%	2,140 + 7%		2,000	2,140	2,290	6,430
Shop Administrator	1,800 + 7%	1,926 + 7%		1,800	1,926	2,061	5,787
Commodities Clerk/Inventories	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Stock Clerk	955 + 7%	1,019 + 7%		955	1,019	1,090	3,064
Stock Clerk	955 + 7%	1,019 + 7%		955	1,019	1,090	3,064
Stock Clerk	955 + 7%	1,019 + 7%		955	1,019	1,090	3,064
Agri. Field Technician	930 + 7%	995 + 7%		930	995	1,065	2,990
Mechanic	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Mechanic	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Driver	1,150 + 7%	1,231 + 7%		1,150	1,231	1,317	3,698
Driver	1,150 + 7%	1,231 + 7%		1,150	1,231	1,317	3,698
Boat Driver	520 + 7%	556 + 7%		520	556	595	1,671
Guard/Handyman	450 + 7%	482 + 7%		450	482	516	1,448
Guard	450 + 7%	482 + 7%		450	482	516	1,448
Worker	530 + 7%	567 + 7%		530	567	607	1,704
Worker	530 + 7%	567 + 7%		530	567	607	1,704
Worker	530 + 7%	567 + 7%		530	567	607	1,704
Radio Operator	880 + 7%	942 + 7%		880	942	1,008	2,830
Secretary	880 + 7%	942 + 7%		880	942	1,008	2,830

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
Assistant Credit Manager	1,500 + 7%	1,605 + 7%		1,500	1,605	1,717	4,822
Agri. Field Technician	930 + 7%	995 + 7%		930	995	1,065	2,990
Worker	530 + 7%	567 + 7%		530	567	607	1,704
Worker	530 + 7%	567 + 7%		530	567	607	1,704
AFRICARE HEADQUARTERS STAFF							
Project Officer	10,000 + 7%	10,700 + 7%		10,000	10,700	11,450	32,150
Secretary	5,000 + 7%	5,350 + 7%		5,000	5,350	5,725	16,075
AFRICARE CONSULTANTS							
Agricultural Economist	-----	200 x 15		2,850	-----	3,000	5,850
Soil/Water Management	-----	-----		2,850	-----	-----	2,850
Credit/Cooperative Management	-----	200 x 15		2,850	-----	3,000	5,850
Evaluators	190 x 15	200 x 15		2,850	2,850	3,000	8,700
Evaluators	190 x 15	200 x 15		2,850	2,850	3,000	8,700
Evaluator	190 x 15	200 x 15		---	2,850	3,000	5,850
Evaluator	190 x 15	200 x 15		---	2,850	3,000	5,850
AFRICARE TEMPORARY EMPLOYEES							
GRANTEE'S TEMPORARY LABOR				1,500	1,500	1,500	4,500
- Research Station Collaboration				2,000	2,000	2,000	6,000
- Interfacing Action Ble Ext. Agents							
- Cooperative Development							
FRINGE (24%) (193,505 x 24%) (Total CC's 1 through 3 x 24%)	207,044 x 24%	221,537 x 24%		49,345	52,797	56,494	158,636
RECRUITING							
Ads, 5 positions x 3 ads @ $300.00 each	----			4,500	----	1,800	6,300
Travel 8 x $300.00 Roundtrip	----			2,400	----	1,200	3,600
Per diem 8 x $75.00/day x 2	----			1,200	----	600	1,800
RELOCATION + INCIDENTALS							
Orientation Per Diem				5,250	----	2,100	7,350
5 x $75.00/day x 14 days				1,600	----	1,064	2,664
3 x $38.00/day x 14 days							
SUB TOTAL (Salaries, Fringe, Recruiting & Relocation)				287,650	287,688	320,148	895,486

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
II. TRAVEL & RELOCATION							
TRAVEL INCIDENTALS (shots, physicals, medecine, photos, passport, visas- 8 x $500.)	----		4 persons COS 4 persons to project	4,000	----	4,000	8,000
RELOCATION: PERSONAL FREIGHT 3 families @ $5.00 x 1000 kg		2 families returning @ $5.00 x 1000kg	----	15,000	10,000	----	25,000
2 singles @ $5.00 x 850 kg		----	2 families @$5.00 x 1000 kg to project	8,500	----	10,000	18,500
RELOCATION: TRANSPORTATION 8 one-way x $1,500		4 one-way x 1,500	10 one-way x $1,500	12,000	6,000	15,000	33,000
RELOCATION: SUBSISTENCE 8 days x $75 x 5 persons		----	8 days x $75 x 2 persons	3,000	----	1,200	4,200
5 days x $38 x 2 persons		----	8 days x $38 x 2 persons	912	----	608	1,520
SETTLING IN ALLOWANCE 5 x $500		----	2 x $500	2,500	----	1,000	3,500
HOUSEHOLD FURNISHINGS 3 x $3,500		replacement expense	replacement expense	10,500	3,500	3,500	17,500
HOUSEHOLD REPAIR/ MAINTENANCE (7 x $2250)		7 x $1,000	7 x $714	15,750	7,000	5,000	27,750
HOUSING RENTAL							
5 houses @ $250/mo x 12 (Dire)		+ 10%	+ 10%	15,000	16,500	18.150	49,650
1 house @ $194 x 12 (Proj. Mgr)		+ 10%	+ 10%	2,328	2,560	2,816	7,704
1 house @ $444 x 12 (Admin. Asst)		+ 10%	+ 10%	5,328	5,860	6,446	17,634

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
32 GENERAL TRANSPORTATION & GAS							
Project Mgr (6 trips overland)		+ 10%	+ 10%	3,000	3,300	3,630	9,930
Project Asst. - 6 trips							
3 RT air @ $500							
3 overland @$1,500							
Bamako		+10%	+10%	3,000	3,300	3,630	9,930
Project Site (3 vehicles)							
12 overland trips Bmko		+ 10%	+ 10%	3,000	3,300	3,630	9,930
Local operations		+ 10%	+ 10%	4,500	4,950	5,445	14,895
Hino Truck							
1000 liters RT x $450		+ 10%	+ 10%	2,700	2,970	3,270	8,940
Operations Local		+ 10%	+ 10%	2,300	2,530	2,780	7,610
5 Motorcycles-local (Dire)		+ 10%	+ 10%	1,000	1,100	1,210	3,310
1 " Bamako operations		+ 10%	+ 10%	135	150	165	450
Boats							
4 boats- local operations							
(100 l/month x 4 x 12 mos)		+ 10%	+ 10%	2,500	2,750	3,025	8,275
Cooperative Development							
Research, Extension Services							
200 l/m x 12 x 185/l. diesel		+ 10%	+ 10%	1,000	1,100	1,210	3,310
210 l/m x 12 x 260 CFA/l. (gas)		+ 10%	+ 10%	1,450	1,595	1,755	4,800
Generator Fuel							
100 l./mo x 12 x 185 CFA/l		+ 20%	(2nd group in place)	2,000	2,400	4,000	8,400
33 GENERAL SUBSISTENCE							
Project Mgr. (7 days x 7 trips							
x $17.00)		+ 10 %	+ 10%	833	916	1,007	2,756
Admin. Asst.(7 days x 6							
trips x $17.00)		+-10%	+-10%	714	785	863	2,362
Admin Secy (7 days x 3							
trips x $17.)		+ 10%	+ 10%	357	392	431	1,180
5 site-based tech. assts.							
(15 trips x 7 days x $50.							
Dire-Bamako)		+ 10%	+ 10%	5,250	5,775	5,827	16,852
Field hire Staff							
6 x hourly wage x 23 days							
x 12 months		+ 5%	+ 5%	1,500	1,575	1,653	4,728

CC	Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
34	LIGHT VEHICLE REPAIR & SERVICE							
	All vehicles (10,000/yr)		+ 20%	+ 20%	10,000	12,000	14,440	36,440
36	HOME LEAVE TRAVEL							
	----		5 RT tickets x $3200	----	----	16,000	----	16,000
37	INT'L TRANSPORTATION							
	5 consultants RT x $3000		4 evaluators RT x $3200	6 cons. RT x $3500	15,000	12,800	21,000	48,800
	2 trips to Burkina RT x $120		same	same	240	240	240	720
	------		Proj Mgr RT to Wash;DC @ $3200	Proj. Mgr. RT to DC @ $3500	----	3,200	3,500	6,700
38	INT'L SUBSISTENCE							
	5 consultants x 15 days x $67		4 cons. x 15 days x $70	6 cons. x 15 days x $75	5,025	4,200	6,750	15,975
	2 trips Burkina x 7 days x $62		2 trips x 7 days x $65	2 trips x 7 days x $70	868	910	980	2,758
	------		Proj. Mgr. 14 days x $65	Proj Mgr 14 days x $70	------	910	980	1,890
	SUB.TOTAL: TRAVEL & RELOCATION				161,190	140,568	159,141	460,899

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
III. EQUIPMENT & SUPPLIES							
MACHINE SHOP TOOLS (cylinder boring equip., valve grinding station, crankshaft polishing equip.)		specific tools for Lombardini & other motors	----	30,000	[illegible]	----	45,000
PUMPS							
20 pumps x $1500		20 pumps x $1500	20 pumps x $1500	30,000	30,000	30,000	90,000
COMPUTER SYSTEM SOFTWARE		Additional Software	Additional Software	1,200	1,000	1,000	3,200
COMPUTER HARDWARE Med. sized machine w printer		-------	-------	5,000	-----	------	5,000
-------		Additional Generator (10 KVA)	-------	-------	7,000	------	7,000
TECHNICIAN TOOLS Ag. research, soil test kit, flow measuring device, surveying equip. etc.		Additional Tools	-------	10,000	3,000	------	13,000
TRACTORS (Experimentation using mechanized tillage)		-------	-------	10,000	------	-------	10,000
HEAVY TRUCKS		-------	-------	40,000	------	-------	40,000
LIGHT TRUCKS (2)		-------	-------	25,000	------	-------	25,000
MOTORCYCLES 2 motorbikes		1 replacement	-------	2,250	1,500	-------	3,750
3 mobylettes ($500 ea.)		2 mobylettes	-------	1,500	1,000	-------	2,500
AFRICARE OFFICE EQUIPMENT							
Mimeograph machine		-------	-------	1,500	------	-------	1,500
2 IBM typewriters (3,000 ea.)		-------	-------	6,000	------	-------	6,000

Year 1 Description	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
[illegible] office [illegible]	-------	-------	700	------	------	700
[illegible] cabinet for computer	-------	-------	325	------	------	325
[illegible]	-------	-------	2,777	------	------	2,777
[illegible]	-------	-------	250	------	------	250
[illegible]	-------	-------	2,500	------	------	2,500
EQUIPMENT REPAIR	+ 10%	+ 10%	3,000	3,300	3,630	9,930
MACHINE SHOP	-------	------	1,000	1,000	1,000	3,000
SPECIALITY TOOLS: FOR PUMPS & MOTORS			500	500	500	1,500
COMPUTER SUPPLIES			1,000	500	500	2,000
SHOP SUPPLIES			2,000	2,000	2,000	6,000
TECHNICIAN SUPPLIES			2,000	1,000	1,000	4,000
OFFICE SUPPLIES ([illegible])			6,000	6,000	6,000	18,000
PHOTOCOPYING & [illegible]			1,[illegible]	1,5[illegible]	[illegible]	4,500
PHOTOGRAPHY, PRINTING, [illegible]			[illegible]	1,[illegible]	[illegible]000	4,000
SUB TOTAL: EQUIPMENT & SUPPLIES			188,002	75,300	48,130	311,432
IV. CONSTRUCTION						
New Grain Warehouse	Installation 2nd group	------	3,000	3,000	------	6,000
Complet Office/Admin Lab Rooms	--------	------	3,000	------	------	3,000
------------	Dike Construc-stion	------	-----	3,000	------	3,000
New Grain Warehouse	--------	------	2,000	------	------	2,000
Materials for Completion of Office/Admin. Lab Bldg.	--------	------	4,000	------	------	4,000
------------	Materials for Dike Construction	------	-----	2,000	------	2,000

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
DESIGN & ENGINEERING COSTS bridge, dam between Dire-Bourem	-------	-------		500	------	------	500
SUB TOTAL: CONSTRUCTION				12,500	8,000	------	20,500
V. TRAINING							
SUBSCRIPTIONS AND PUBLICATIONS	same	same		300	300	300	900
TRAINING MATERIALS	same	same		10,000	10,000	10,000	30,000
WORKSHOP TRAVEL & ALLOWANCE							
Mechanics	same	same		2,500	2,500	2,500	7,500
Cooperatives				2,500	3,000	4,000	9,500
SUB TOTAL : TRAINING				15,300	15,800	16,800	47,900
VI. OTHER DIRECT							
DEPENDENTS' EDUCATION (3 families x $6,000/yr)	same	same		18,000	18,000	18,000	54,000
FREIGHT ON COMMODITY PURCHASE				20,000	20,000	10,000	50,000
BUSINESS AND VEHICLE INSURANCE				2,500	2,500	2,500	7,500
[illegible]S AND DUTIES				500	500	500	1,500
[illegible]EPHONE AND TELEX				2,500	2,500	2,500	7,500
[illegible]STAGE AND DELIVERY				500	500	500	1,500
OFFICE OPERATION & MAINTENANCE				1,000	1,500	1,500	4,000
BANK FEES & FOREIGN EXCHANGE LOSSES				500	1,000	1,000	2,500
OTHER DIRECT COSTS				1,500	1,500	1,000	4,000
SUB TOTAL: OTHER DIRECT				47,000	48,000	37,500	132,500

Description	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	TOTAL
VII. INDIRECT COSTS							
LEVEL I - INDIRECT							
(Salaries, Fringe, Recruiting & Relocation, Travel, Training & Other Direct) x 25.8%							
511,140 x 25.8 %		492,056 x 25.8%	533,591 x 25.8%	131,874	126,950	137,667	396,491
LEVEL II -INDIRECT							
(Equipment & Supplies, Consultation) x 12.9%							
646,500 x 12.9%		83,300 x 12.9%	48,130 x 12.9%	25,864	10,745	6,208	42,817
TOTAL INDIRECT COSTS				157,738	137,695	143,875	439,308
GRAND TOTAL				869,380	713,052	725,596	2,308,028

Contribution by Donor

Africare: $450,000

Funds will be used for the procurement of project equipment and supplies; expatriate and local salaries; travel, lodging, and other indirect costs.

U.S.A.I.D.: $1,858,000

As with Africare expenditures, funds will be used for project procurement, expatriate and local salaries, and other indirect costs.

Additional Inputs from the Government of Mali: $230,000

Revolving Credit Fund.....	$175,000
Extension $ Support Services.....	$ 50,000
Three Hectares Project Site.....	$ 5,400
Total	$230,000

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

PROJECT TITLE: Activites Paysannes

LIFE OF PROJECT
FROM FY TO FY
TOTAL U.S. FUNDING
DATE PREPARED

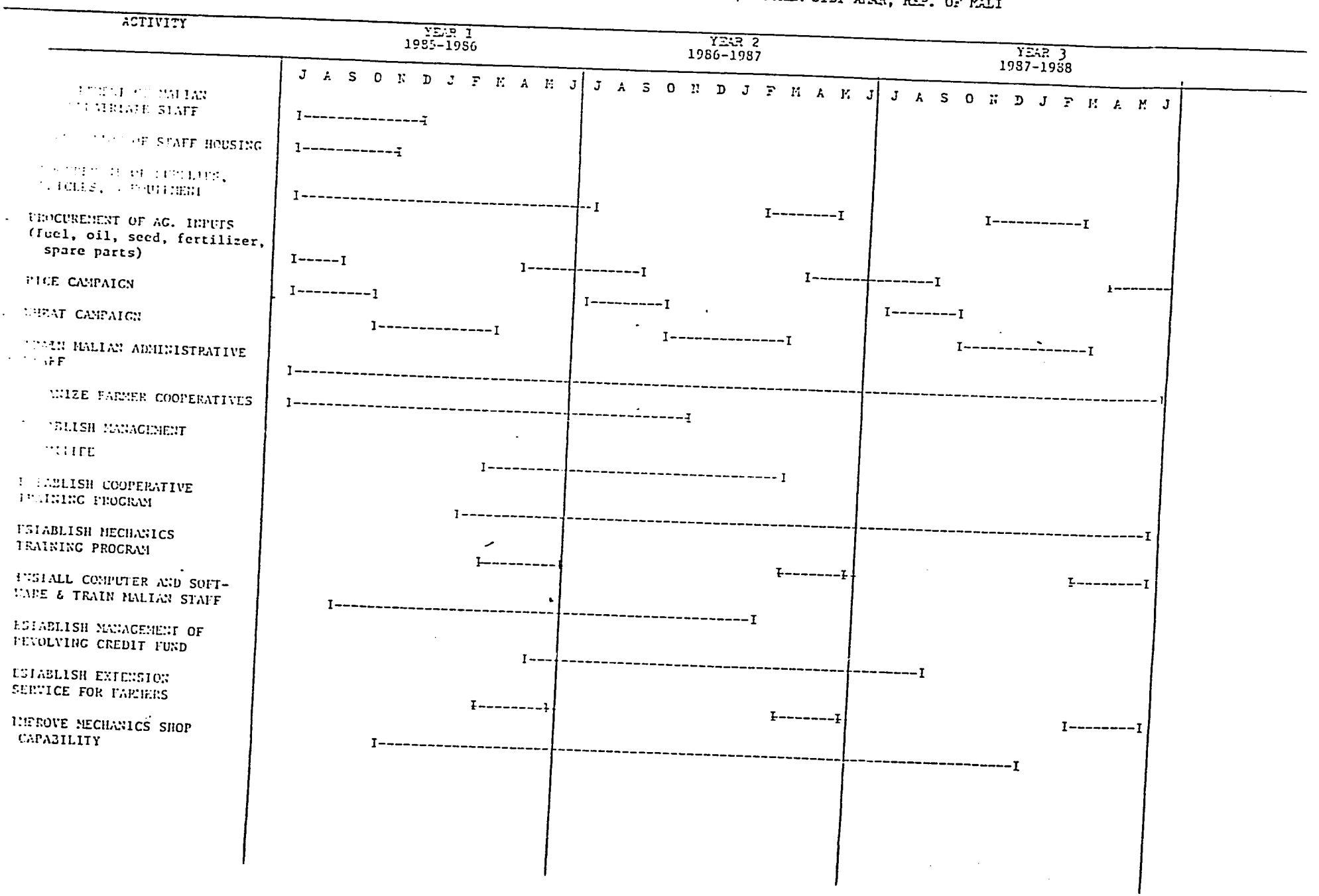
[illegible]	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
GOAL			
[illegible]te self sufficiency in food [illegible]ugh production activities and [illegible] management of water and soil [illegible]ources	1. Increased food production 2. Increased irrigation projects 3. Increased Agro-forestry activities	1. Reports - Min. Agriculture 2. Reports - Min. Rur. Devel. 3. Reports - Eaux et Forets	1) Since GRM considers food production a high priority, it will devote a fair portion of its nat'l budget and resources to promote this policy 2) Because of the negative impact of the drought and famine, the int'l community will be willing to support food production efforts [illegible] drought and its impact [illegible] environment is not further [illegible]
PURPOSE			
Increase production of food crops	1a) Wheat production increased from 700 tons/year to 1,800 tons/year 1b) Increase rice & millet production from 400 tons/year to 900 tons 1c) Spices production increased from 50 tons/year to 120 tons/year	1a) Project production data 1b) Action Ble production figures 1c) Cooperative & farmer records	An adequate supply of pumps & parts will be available
Organize farmer cooperatives	2a) 1 general cooperative and 10 sub-cooperatives 2b) Purchasing, recuperation, and storage/marketing committees 2c) Management committee	2a) Project reports and records showing official GRM recognition of coop 2b) Farmer participation in commodities management	2a) That farmers are willing to be actively involved in managing their agricultural activities

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Provide a service supply of fuel and oil	3a) Increased storage capacity to 200,000 l of diesel fuel (50,000 l. Bourem, 150,000 l. Dire) 3b) Establish reliable delivery system 3c) Procurement and logistical support system established	Project reports and records	3a) That nat'l transport systems, esp. boat traffic, continues to operate 3b) Fuel is available in-country 3c) That percentage of credit recuperation is high enough to maintain adequate cash flow
Provide a service supply of pumps and parts	4a) 300 pumps in operation 4b) Adequate supply of spare parts in stock room	4a) Project records 4b) Inventory records	4a) Sufficient funds will be available to purchase pumps and parts 4b) An economical pump is available and suited to the needs of the farmer
th[illegible]anagement of a [illegible]d	5a) Credit available to 300 farmers 5b) 90-100% recuperation rate 5c) Credit system is managed by the cooperative	5a) Project credit records 5b) Centre Assistance Cooperatif audit reports	5a) High level of credit recuperation 5b) The management committee will supervise person(s) responsible for daily operations of the revolving credit fund. 5c) That CAC will regularly audit and control project credit records
Establish a mechanic maintenance service for pumps	6) 30 trained mechanics serving farmers	6) Project records & mechanics training program	6a) Sufficient mechanics will be trained & available to serve farmers 6b) Adequate system of payment established for work done by mechanics for farmers

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATIONS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Strenghten the extension service to farmers	7a) 10 agricultural extions agents 7b) 2 cooperative agents supporting farmers 7c) 10 demonstration plots within farmer community per year	7a) Action Ble/Min. of Ag. reports 7 records 7b) CAC reports & records	7a) Min of Ag. & Action Ble have extension agents serving the community 7b) CAC has cooperative agents serving community
ide service supply system for ., fertilizer and other inputs	8a) 90 tons seed per year 8b) 90 tons urea/90 tons phosphate	8a) Project records 8b) Project records	8a) Seed supply will come from previous year's crop 8b) New varieties of tested seed made available through research services in Min. of Ag.
Establish a mechanics Shop	9a) Facility for repair and maintenance	9a) Project reports 9b) Project reports & records	9) Adequate equipment & supplies made available
Establish a cooperative training program	10a) 250 farmers literate 10b) Trained farmers management 10c) 10 officers local coop groups trained	10a) CAC records & reports 10b) CAC records & reports 10c) CAC records & reports	10) Farmers willing to accept training; wanting to participate in training program
Establishing a mechanics training program	11a) 30 mechanics trained 11b) 16 mechanics re-trained	11a) Project records 11b) Project records	11) Availability of people motivated to learn skills
·reate alternative energy · pumping programs	12) Solar energy, windmills, animal power	12) Project records	12) If funds can be made available
· nd analyzing data	13) Agriculture production, economic data, social, energy	13) Project reports	13) If computer and necessary software will be made available

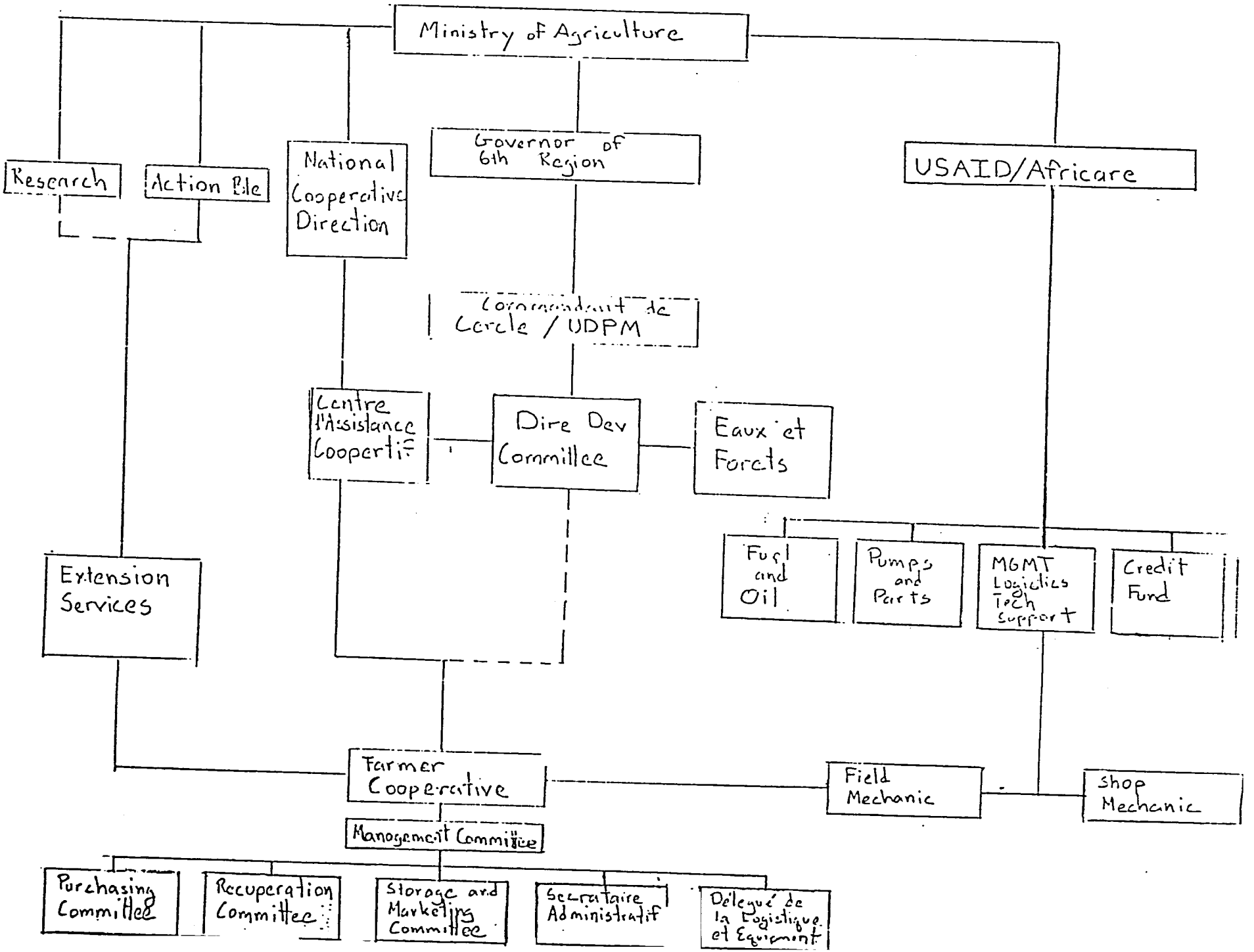
NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OUTPUTS			
1. Food Production:	1800 tons per year of wheat 900 tons other cereals (rice, millet and sorghum) spices 900 hectares under cultivation		
2. Farmer Cooperatives:	One general cooperative, ten sub-coops		
3. Fuel Supply:	200,000 liters available		
4. Pump & Part Supply:	300 motorpumps, adequate supply of spare parts		
5. Revolving Credit Fund:	300 farmers receiving credit		
6. Mechanics Maintenance Service:	30 mechanics serving farmers		
7. Extension Service	10 Ag. extension agents 2 Coop. extension agents		
8. Ag. Input Service Supply System:	90 tons seed per year, 180 tons fertilizer.		
Mechanics Shop:	An efficient pump repair and maintenance infrastructure to serve the farmers.		
[illegible] Training:	250 literate farmers		
[illegible] Training [illegible]:	30 mechanics trained; 16 mechanics retrained		
12. Energy Demonstration Program:	improve efficiency of scarce resource utilization		
13. Resource Data Base	extensive data sets on project operations and outputs		
14. Construction:	Cereal warehouse, dike, completion of office, lab, & lodging facility; installation of 2nd generator		

IMPLEMENTATION PLAN 3 YEAR PROJECT PROPOSAL ACTIVITES PAYSANNES / BOUREM SIDI AMAR, REP. OF MALI



IMPLEMENTATION PLAN 3 YEAR PROJECT PROPOSAL ACTIVITES PAYSANNES / BOUREM SIDI ARAR, REP. OF MALI

ACTIVITY	YEAR 1												YEAR 2												YEAR 3											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
CONSTRUCTION OF GRAIN STORAGE FACILITY	I											I																								
17. COMPLETE OFFICE/ADMIN. BUILDING	I												I																							
18. INSTALLATION OF 2ND GROUP																	I							I												
19. CONSTRUCTION OF DAM																			I					I												
20. MALIAN STAFF/COOPERATIVES TAKE OVER OPERATIONS																					I			I												
21. DATA COLLECTION	I																																			I
22. AGRICULTURAL RESEARCH			I																																	I
23. ALTERNATIVE ENERGY PROGRAM			I																																	I
24. ON-SITE EVALUATIONS							I		I										I		I										I		I			I


Ministry of Agriculture
Research
Action Pilc
National Cooperative Direction
Governor of 6th Region
USAID/Africare
Commandant de Cercle / UDPM
Centre d'Assistance Cooperati
Dire Dev Committee
Eaux et Forets
Extension Services
Fuel and Oil
Pumps and Parts
MGMT Logistics Tech Support
Credit Fund
Farmer Cooperative
Field Mechanic
Shop Mechanic
Management Committee
Purchasing Committee
Recuperation Committee
Storage and Marketing Committee
Secretaire Administratif
Delegué de la Logistique et Equipment

APPENDIX

THE AFRICAN FOOD SYSTEMS INITIATIVE

POTENTIAL AND OPTIONS FOR PEACE CORPS PROGRAMMING IN MALI

FEBRUARY 1985

III.

III. THE IRRIGATED AGRICULTURE OPTION IN DIRE

Personnel with both Peace Corps/Mali and AID/Bamako strongly suggested that our mission consider the option of placing Initiative volunteers in the Diré area to support an ongoing AID/Africare/IER activity in irrigated agriculture. Time constraints prevented the members of our mission from visiting the Diré region to study the potential opportunities for Peace Corps programming. We did, however, have access to an extensive AID reading file on past and present project activities in Diré, which we reviewed in its entirety. We also had the opportunity to talk with the Malian director of the IER research station in Diré about his program and the possibilities for volunteer placements with IER; to the Africare country representative about the Africare program in the area; and with Peace Corps/Mali and AID personnel about their previous experiences with the project activity.

Lacking conclusive information either to support or to reject the tenative suggestions made to us regarding the Diré option, we have included it in this report as an option needing further investigation and with any mission comments or recommendations.

1. The Rationale for Considering Diré as a Geographic Focus for Volunteer Placements under the Africa Food Systems Initiative

a. Located on the north side of the Niger River on the great northern bend, Diré and its surrounding area has been the site of irrigated agricultural activity for a very long time. Traditional practices include flooded rice, sorghum and other cereals in seasonally inundated low areas and vegetable gardening. The horticultural activities have taken on greater importance in view of the continuing decline of other sectors of the local economy - i.e. transhumant herding, fishing, and extensive rainfed cereals cultivation - in the face of continuing drought conditions.

b. AID, IER, Africare and, to a lesser extent, Peace Corps/Mali have all had recent experience working in the Diré area. The project activities revolve around trying to develop a technically feasible and economically viable agricultural technical package for irrigated crops in the Diré area, particularly for wheat, spices, and vegetables. While no one would characterize the results as uniformly positive, there is within the American development community in Mali considerable programming expertise on the problems of Diré. What is perhaps more to the point, prior experiences in Diré have convinced some people that there is considerable potential for increased agricultural production in the area, that the major problems in implementation of project activities have been faced and overcome, and that it is worth continuing the effort.

c. The Malian Government has recently indicated that Diré has been chosen as a high priority area in the country to receive particular attention in agricultural programming. Through the newly announced Grassroots Initiative - i.e. Initiative de Base - program, considerable resources have been allocated to this area, which is one of the few food producing areas in the cereal-deficit area of northern Mali.

2. The Project Goal

The goal of any activity which would be elaborated under this option is broadly similar to that set for the two proposals previously outlined: to enhance rural household production, productivity, income, and food security through agricultural development and related support activities.

3. The Project Objectives

With regard to the tenative suggestion put forward to our mission for possible Volunteer placement

in Diré, the objectives of such activities seem to fit into these categories:

a. To strengthen the development of producer organizations at the commune level to concert with local needs.

b. To strengthen regional capacities in the design and implementation of irrigated crop research efforts.

c. To build local capacity in maintenance and repair of equipment for irrigation perimeters.

d. To assist the various agencies operating in the area to cooperate more effectively in areas of mutual interest.

4. The Potential Project Beneficiaries

At the suggested Volunteer placements involve two distinct programs, the potential beneficiary populations are distinct also, if somewhat overlapping. They are:

a. If Volunteers were placed within the Activites Paysannes program, their work could be expected to benefit the approximately 400 families served by that program presently.

b. For Volunteers who might be assigned to work with the research station of IER, their work would conceivably have importance for any or all of the 2,400 rural households that participate in irrigated agriculture in Diré and the surrounding areas.

5. The Potential Integration of Women into the Project

To date nothing has been presented on this topic during our discussions; nor has our document study shed any light on the topic.

6. The Integration with Local Organizations

The relations among the Diré development agencies must be understood in the light of recent inter agency history. In mid-1978, AID project authorization was given to fund a Malian parastatal, Action Blé-Diré, to do a large-scale irrigation project, based upon use of imported irrigation pumps. As a result of several negative evaluations of the project in 1981 and 1983, AID terminat its participation with Action Blé-Diré on rather short notice.

In order to phase out its involvement in Diré in a somewhat orderly fashion, AID then funded Africare in 1983 and 1984 under the title Activites Paysanne to carry out certain elements of the scaled down earlier project. Another element in the overall Diré development scene is an AID-funded IER research station working on agricultural studies such as varietal testing, and irriga water spacing trials.

No doubt there are still other players in the organizational scene in Diré. One of these soon will be the Grassroots Initiative program, though it is not clear from our discussions what institutional form this activity will take. Another undefined group is apparently an organization of producers themselves affiliated with a local political leader but, again, what role they are likely to play in the future is unknown at present.

With reference to the heading of this sub-section, there does not seem to be much integration of [illegible]izations in the Diré area [illegible]ion Blé-Diré, which continues some programs on a small [illegible] not coordinate activi[illegible] Activités Paysannes. And, the current IER on-station

7. The Proposed Collaborative Framework

No collaborative framework has been proposed for the tentative Volunteer assignments suggested in our mission. Or, more accurately, several frameworks were proposed, supported by one or more parties to the discussions, but none meet universal approval. In fact, one of the overriding concerns in programming in Diré by Peace Corps is precisely in identifying an established and acceptable host agency within which to place any Volunteers. The IER operation could apparently benefit from some skilled technical assistance but in somewhat isolated position vis-a-vis the two implementing agencies in hardly a recommendation as the sole Volunteer placement agency. Activité Diré appears to be discredited and is not mentioned as a possible host agency by anyone. Finally, Activité Paysanne is apparently just a name given to the AID funding mechanism for Africare and has no institutional status independent of that funding. The current Peace Corps/Mali Director has expressed serious reservations about assigning Volunteers to an American PVO in this situation.

In sum, there is no collaborative framework at this time. It would seem that some kind of relationship between IER and Activité Paysanne could be developed to mutual benefit, but the feasibility of this remains to be explored.

8. The Proposed Volunteer Project Activities

The Diré option may include activities which not only strengthen research capacities of the agencies now conducting crop trials on wheat, sorghum and rice, but aid producer organizations in applying research results in the Diré area. Working within the research facility of the IER and with Africare, skilled Volunteers may aid in on-going trials and evaluations designed to improve seed varieties, and cultivation/irrigation practices. In addition, Volunteers might help to organ and train producer organizations under Activité Paysanne, especially for purposes of marketing and agricultural equipment acquisition and maintenance.

Although specific duties for the following Volunteer positions are as yet unclear, AID, IER and Africare personnel suggested needs for the following:

a. Volunteer Placements within the IER Research Station

The following positions were suggested during an informal discussion with the Director of the IER Diré station:

1. An Agronomist Skilled in Irrigated Agriculture

This Volunteer would presumably aid in the design, implementation and evaluation of varietal and other experiments with wheat, rice, sorghum, and other crops at the research station.

2. An Agricultural Economist

This Volunteer would assist in the data collection and analyses for agricultural experiments on and off-station.

3. An Irrigation Specialist

This Volunteer would aid in the design, implementation and evaluation of irrigation experiments with wheat, rice, sorghum and other crops at the research station. The Volunteer's work would include work with different soil types in the area with respect to water penetration,

irrigation and water-lifting devices, both manual and mechanical.

Africare/Activité Paysanne

In discussions with Africare/Mali and AID identified the following possible Volunteer positions in Diré. Volunteers would act to strengthen producer organizations under the Activité Paysanne program.

Rural Credit Specialist

Would work within Activité Paysanne to analyze the effects of current credit and suggest possible improvements in their structure and operations.

2. Cooperatives/Producer Organization Specialist

This Volunteer would organize new producer organizations and strengthen existing organizations to increasingly manage their own affairs. Duties might include interpreting research results for application to local agricultural practices as well as linking producer organizations with existing research agencies in the region.

3. Mechanic(s) for Pump Maintenance

Volunteer(s) would design and implement a training program for irrigation pump maintenance and repair.

6. The Projected Volunteer Strength and Skill Requirements

Tentative placements within IER and Africare/Activité Paysanne suggest a minimum of seven Volunteer placements under the Initiative. Four would be assigned to IER and a minimum of three would be assigned to Africare/Activité Paysanne. Actual positions have barely been identified informally and skill requirements may be identified in the broadest sense only.

Note, however, that the nature of the positions precludes the use of BA/BS generalists. The most appropriate candidates for research positions may be those educated to the Master's level in the required specialty, particularly since researchers in both agencies are trained and qualified. The difficult nature of the extension and mechanical assignments suggests that only experienced, qualified candidates be considered for work with cooperatives, agricultural implements and equipment and irrigation pump maintenance.

Finally, advance knowledge of French is highly desirable for technical researchers.

10. The Projected Project Resource Requirements

Volunteer support, from Peace Corps/Mali, will be an important consideration under the Diré option. Diré is accessible by road, river and air, but air transport is the only timely means of making necessary site visits from Peace Corps headquarters in Bamako. The sponsoring agency, or AID, should provide necessary funds for emergency evacuation and job and service related transportation to and from Bamako as needed.

Volunteers assigned to the Diré-based services should be provided with a reliable means of both personal and job-related transportation, dependent upon the extent to which travel has been programmed into their duties.

I. The Project Specific Training Requirements

Skilled volunteers assigned to IER must have a thorough introduction to the administrative structure of the research station and the principle foci of research efforts in the past. Volunteer researchers should learn scientific French vocabulary pertinent to their area of expertise. Training should include a thorough introduction to IER administrative protocol, preferred research methodology and report-writing and inter-office communication formats.

Because the socio-cultural environment in the Diré region is much different than that of the Bamako-Ségou regions, cross-cultural training must be tailored to give Africare/Activité Paysanne volunteers a thorough introduction to the Diré region. Volunteers acting as extension agents will need a complete introduction to the research, producer and extension organizations now operating in the region, with special emphasis on the existing linkages between them. Language training for extension volunteers must also include the predominant local language, especially for Africare/Activité Paysanne assignments.

II. The Projected Measures of Project Achievement

Foreseeable measures of project achievement involve the extent to which productive linkages can be formed between producer organizations and the research and extension agencies now working in the region. At the level of IER project achievement may be measured in terms of the number of research projects undertaken and completed.

To evaluate linkages between the agricultural extension and research agencies and the producer organizations, the changes in agricultural techniques, irrigation practices, crop make-up and yields should reflect the effectiveness of extension efforts and applied research.

The change in the number of credit-worthy and credit-receiving producer organizations should also serve as an indicator of organizational growth for Activité Paysanne.